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The genus *Ptilomera* Amyot and Serville (Gerridae: Hemiptera)*

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ABSTRACT: This paper redescribes and illustrates all types and gives a key to both males and females.

Resurrects from synonymy: P. laelaps Breddin, P. oribasus Breddin and P. sumizome Esaki.

Accepts P. asbolus Breddin and P. argus Breddin as synonyms of P. dromas Breddin. Makes P. harpyia Schmidt a synonym of P. tigrina Uhler with a reservation, P. lachne Schmidt as the synonym of P. agriodes Schmidt, P. canace Schmidt as synonym of P. cingalensis Stål.

Describes thirteen species as new: P. assamensis from Assam; P. chinai, P. nunikanensis, P. kirkaldyi, P. sarawakensis, P. maai, P. gressitti from Borneo; P. lundbladi, P. sumatranus from Sumatra; P. sumbaensis from Sumba Island; P. timorensis from Timor Island; P. breddini, P. papuensis from New Guinea.

The paper also describes *P. harpyia ceramensis* as a new subspecies from Ceram, an island in the Molluccas and *P. aëllo cheesmanae* as a new subspecies from New Guinea.

The genus Ptilomera Amyot and Serville

- 1843. Amyot et Serville, Hist. nat. Ins. Hémipt. I:413 (for Gerris laticauda Hardw. (They misspelled G. laticaudata Hardw.)
- 1853. Herrich-Schaeffer, Wanz. Insekten 9:65, Taf. 305, fig. 940. (Recorded and figured a species from Java which was not *P. laticaudata*.)
- 1901. Breddin, Abh. Naturf. Ges. Halle, 24:86-89 Taf. 1, figs. 10-14. (Described P. pamphagus, P. dorceus, P. oribasus, P. laelaps §.)
- 1903. Distant, Faun. Brit. Ind. Rhynch. 2:185.
- 1903. Breddin, Societas Entomologica 17:147-48. (Described four new species, P. laelaps Q, P. dromas, P. argus, P. hylactor.)

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^{••} The senior author takes primary responsibility for the recognition of species and for the keys and descriptions of species and the junior author for the measurements and illustrations. However, we have checked each other's work throughout.

- 1905. Breddin, Mit. Naturh. Mus. Hamburg, 22:132-135. (Described P. asbolus, P. argus.)
- 1906. Breddin, Societas Entomologica, 21(2):9. (Described P. aëllo.)
- 1909. Kirkaldy, Canad. Ent. 41:390. (Described Ptilomera (Rheumatogonus) subg. new.)
- 1925. Esaki, Philip. Jour. Sci. 26(1):59-60, Pl. 1, figs. 7-8.
- 1926. Schmidt, Ent. Mitteil. 15(1):63. (Described five new species, P. agriodes, P. lachne, P. canace, P. harpyia, P. harpalos.)
- 1927. Esaki, Rev. Esp. Ent. (3):251, 254, 258-261. (Described Ptilomerinae as new subf., keyed out genera, listed seventeen species of *Ptilomera*.)
- 1933. Lundblad, Arch. Hydrobiol. Suppl. 12, Tropische Binnengewässer 4:415-429, figs. 133-137, Taf. 13. (Proposed many synonyms.)
- 1934. Lundblad, Ark. Zool. 27A(14):26. (Key to genera of Ptilomerinae.)
- 1941. Kenaga, Univ. of Kansas Sci. Bull. 27(1):169.
- 1942. Kuitert, Univ. of Kansas Sci. Bull. 28(1):118.
- 1960. Hungerford and Matsuda, Univ. of Kansas Sci. Bull. 41(1):7. (Key to genera and subgenera of Ptilomerinae.)
- 1960. Matsuda, Univ. of Kansas Sci. Bull. 41(2):261-270, figs. 33, 36, 119-120, 137, 157, 166, 609-641. (Description of genus *Ptilomera*.)

Ptilomera Amyot and Serville belongs to the gerrid subfamily Ptilomerinae and can be separated from the other seven genera of this subfamily by our "Key to subfamilies, tribes, genera and subgenera of the Gerridae of the World" [Univ. of Kansas Sci. Bull. 41(1):4-5, 7-8, (1960)]. This genus is easy to recognize because all the species are rather large and stout bodied waterstriders with marked sexual dimorphism. The males have a striking fringe of hairs on the rear margin of the distal half, at least, of the middle femur. This is lacking in the female. The male genital segments are large and conspicuous while those of female are not. In this genus the males are often larger than the females which is unusual in the Gerridae. The anterior margin of the head is not bentventrad, widened posteriorly between eyes which are small, broadly rounded on the outer margin and quite broadly concave on inner margin. Antenniferous tubercles divergent anteriorly. Antennae shorter than the body. First segment longer than three following segments together; third segment longer than either second or fourth; fourth segment curved in apical third. Beak short, not extending beyond prosternum.

Apterous forms: The pronotum is subquadrangular in shape, about as wide as or a little wider than head including eyes, wider than long at middle, lateral margins broadly rounded, posterior margin nearly straight or feebly concave. Mesonotum about twice to two and a half times as long as pronotum, without either longitudinal sulcus or lateral longitudinal suture separating mesonotum from mesopleuron. Rear margin of mesonotum medially broadly

prolonged and truncate to concave at rear margin. Metanotum with a median longitudinal depressed black line. Front leg with femur straight, a little longer than tibia; tibia with a conspicuous process at inner apical angle; apical inner surface of femur and basal inner surface of tibia with some tubercles; tarsus a little shorter than tibia, first tarsal segment about twice to a little less than three times as long as second; second segment slightly thickened near apex, claws arising from near apex and with a distinct arolium. Middle leg relatively longer in male than in female; femur of male robust, with a fringe of long hairs on rear margin, except in basal one-fourth; femur in female bare and slender; tibia more or less strongly curved. with shorter fringe of hairs on inner margin in both sexes; first tarsal segment about ten times as long as second segment; second segment with small claws arising from near apex. Hind leg longer than middle leg, relatively longer in male than in female; coxa with a small spine on apical margin except in the subgenus Proptilomera Hungerford and Matsuda; femur a little less than twice as long as tibia; both femur and tibia without fringe of hairs; first and second tarsal segments completely fused, very short, claws arising from near apex.

Macropterous forms: Pronotum with anterior lobe well defined by transverse groove; humeri located at apical third of pronotum, posterior margin broadly rounded. Hemelytra with R + M and Cu veins basally distinct from each other, the two veins basally connected by a cross vein beyond middle of hemelytra. Vein A connected with Cu at about apical third of the wing. Hind wing with vein A distinct and connected with Cu at apical third of wing. Mesosternum has two longitudinal sutures that are not present in apterous forms.

The color and color pattern are practically generically constant. Ground color of all but two species varies from pale testaceous to ferrugineous and the black markings occupy the same relative positions in all, and are more or less covered with a silvery pubescence. Clypeus and antenniferous tubercles brown to black. Head with two pairs of black dots that may be connected into converging lines, and in dark forms also have a black line paralleling inner margin of eyes. Anterior margin of pronotum with a black spot, usually covered by silvery pile behind inner margin of each eye. These spots may or may not be joined. Anterolateral black spot is present on either side of mesonotum. Anterior and lateral margins at least of abdominal tergites dark brown to black. In side view, a brown to black spot on each acetabulum, meso- and metapleural areas covered by a broad black longitudinal band, which may be divided into two bands either by a longitudinal stripe of slivery hairs or by a yellow stripe or by both, with silvery stripe on top of the yellow stripe. A dark band on sides of the abdomen below connexivum. Front femur with two dark longitudinal stripes, one above and one outside. Venter of thorax and abdomen from light brown to white and covered by a silvery pubescence.

Distribution: Confined to the Oriental region and some islands beyond it. In the Continental Asia it is known to occur in Hongkong, China, South India and Kashmir in the north, and eastward through Nepal, Upper Bengal and Assam, southward in Burma and Thailand and eastward in Indochina from Tonkin and Annam to Cambodia. It has been found in the following islands: Ceylon, Sumatra, Java, Borneo, Celebes, Timor, Ceram, New Guinea, Philippines and Formosa.

The most primitive living species of *Ptilomera* we believe to be *Ptilomera* (*Proptilomera*) himalayensis Hungerford and Matsuda from Singla Darjiling, E. Himalayas, and the species we believe to be farthest removed from the norm are *Ptilomera* (*Ptilomera*) werneri Hungerford and Matsuda from the Philippines and *Ptilomera* (*Ptilomera*) timorensis n. sp. from Timor Island.

TAXONOMIC PROBLEMS INVOLVED

When we undertook this study the problems involved in determining species in this genus seemed to us almost unsurmountable. We had plenty of warning.

Esaki (1927), who proposed the subfamily Ptilomerinae and gave a key to its genera, stated that the genus *Ptilomera* contained seventeen described species and that "This genus is taxonomically one of the most difficult groups, as all the species are more or less variable to some extent, and apparently much allied to one another." He merely listed the species.

Dr. Lundblad's (1933) study of the genus *Ptilomera* has been indispensable to us. He had examined all the types except those of *P. tigrina* Uhler, *P. dorceus* Breddin and *P. sumizome* Esaki. It was his conclusion that this is a most difficult genus, and that the females appear to be best for specific determination but are hopelessly variable as shown in his figs. 134, and 136 (see page 489). Secondly that the males appeared to him to be so variable that he did not use them in reaching his conclusion on synonymy. He reduced six species to synonymy and questioned two others. Thirdly, he thought that the various types might be races capable of interbreeding, and that only the study of much material and experiments in rearing might settle the questions.

How much material he studied besides the types we do not know. He recorded *P. dromas* Breddin from six collections in Java, only three of them had both sexes represented. A total of nineteen males and 35 females. Of *P. pamphagus* (his determination, not Breddin's) Lundblad recorded twelve collections from Sumatra only five of which had both sexes represented. A total of eleven males and thirteen females. With the above material it is understandable that he was perplexed.

However, we have already described two new species and in this paper are describing thirteen more. We believe the male characters are quite stable and in no species have we found the females showing the hopeless variations suggested by Lundblad (1933) in his figures 134 and 136 (which we have reproduced on page 489). In fig. 136 Lundblad figured the female type of P. pamphagus Breddin (A), the female type of *P. oribasus* Breddin (G), the female type of P. laelaps Breddin (I) all from Celebes, and six other drawings of females from Sumatra. He believed all nine drawings to be showing the variation in the female of *P. pamphagus* Breddin. When we found three males and three females of *P. laelaps* Breddin in our Kirkaldy Collection bearing the same label as the female type, we discovered that all three females were like the type of laelaps and the males were not like the type of P. pamphagus Breddin. We also found in the British Museum Collection a male and a female of P. oribasus Breddin. The female is like Breddin's type and the male is not like either P. pamphagus Breddin or P. laelaps Breddin. Undoubtedly, here are three good species from Celebes.

We believe that the females of some species show some variations in the length of the connexival spines and in the shape of the caudal lobes of the seventh abdominal segment, but in other species such variations are difficult to find. In the males there may be a little variation in the shape of the pygofer or of the paramere but such variations within a species are small.

This genus *Ptilomera* is, in our experience, almost unique. In many genera it is impossible to identify the females to species because they all look so much alike while the males possess good specific characters. In the genus *Ptilomera* it is the complexity of form of the females that trouble us.

There were other difficulties. Hardwicke (1825) described *Gerris* laticaudata from Nepal and said it was eleven lines long. If his line was 1/12 inch then it should have been more than 23 mm. long. Lundblad (1933) found the type to be around 14 mm. long. Hardwicke had before him two specimens, a macropterous form and an apterous form which he thought were females and the apterous one a nymph. They are both adult males. Yet this error is sex determination was followed by Uhler (1860) when he described *P*. tigrina from three females and thought that they were males. It was not until Breddin (1901), were the sexes correctly recognized.

The pioneer students of the genus *Ptilomera*, Breddin and Schmidt made too much of color in their descriptions. The color pattern is basically the same in all species with the black spots, covered by a silvery pile occupying the same positions in all species. The ground color varying from light to dark within a given species. Hardwicke's Fig. 4 was not correctly drawn, and Uhler did not give a figure. Breddin published figures of the apical abdominal segments of some of his species. The drawings of his female types are useful but those of the males are too small to show the real differences among the species he figured. Schmidt gave no drawings to help identify his species.

While the above authors sometimes compared the size of one species with another, we have often found more variation in size within a species than between species. The former authors sometimes gave length of the leg segments, especially the middle and hind femora, and described the fringe of hairs on the middle femur of the males. We have not found these characters to be of much use in specific determination. We began our studies by trying to measure all segments of the middle and hind legs but the tibia and tarsi are so often curved that it seemed impossible to measure accurately any of these save the femur.

The earlier authors who described species from a single sex of either male or female gave us more names than species. For example, Schmidt described a male and female from South India as different species. When we began this study we had before us the following names. Synonyms suggested by Lundblad (1933) are shown in parentheses.

- 1825. P. laticaudata (Hardwicke), Nepal, male.
- 1855. P. cingalensis Stål, Ceylon, female.
- 1860. P. tigrina Uhler, Hongkong, China, female.
- 1901. P. dromas Breddin, Java. Drawing of female in 1901, description of male and female in 1903. East and South Java.

- 1901. P. dorceus Breddin, Celebes. Described and figured female (same as P. dromas?).
- 1901. P. pamphagus Breddin, Celebes. Described and figured male and female.
- 1901. P. oribasus Breddin, Celebes. Described and figured female (Syn. of P. pamphagus).
- 1901. P. laelaps Breddin, Celebes. Described and figured male, described female in 1903 (syn. of P. pamphagus).
- 1903. P. hylactor Breddin, Annam. Described male and female.
- 1903. P. argus Breddin, W. Java. Described male (syn. of P. dromas).
- 1905. P. asbolus Breddin, W. Java. Described and figured male and female (syn. of P. dromas).
- 1906. P. aëllo Breddin, New Guinea. Described female.
- 1925. P. sumizome Esaki, Celebes. Described and figured male and female (syn. of P. pamphagus).
- 1926. P. agriodes Schmidt, South India. Described male.
- 1926. P. lachne Schmidt, South India. Described female (syn. of P. agriodes).
- 1926. P. canace Schmidt, Ceylon. Described male and female (syn. of P. cingalensis).
- 1926. P. harpyia Schmidt, Cambodia. Described female.
- 1926. P. harpalos Schmidt, W. Sumatra. Described male and female.
- 1931. P. shirakii Esaki, Formosa (nomen nudum).
- 1958. *P. werneri* Hungerford and Matsuda, Philippines. Described and figured male and female.
- 1958. P. himalayensis Hungerford and Matsuda, Himalaya.

Thus there were twenty one names, one of which is a nomen nudum, and eight possible synonyms as suggested by Dr. Lundblad. Moreover, only ten species were known from both sexes. Three species from males only and seven species from females only.

From our preliminary studies of this genus we found the male characters quite stable and in no species did the females show the hopeless variation suggested by Lundblad (1933) in his figures 134 and 136. It seemed imperative that we re-examine the types of all species of *Ptilomera*. This we were permitted to do by the kindness of the following: Dr. R. Sailer of the U. S. National Museum in Washington D. C., Dr. W. E. China and Mr. R. J. Izzard of the British Museum in London, Dr. T. Jaczewski of the Polish Academy of Sciences in Warsaw, Dr. H. Sachtleben of the Deutsches Entomologisches Institut in Berlin and Mr. T. Hidaka of the Kyushu University in Fukuoka, Japan. Our task has been to redescribe and illustrate all types, find females to match three male types and males to match seven female types and prove or disprove all synonymys. This we have been able to do for all but two. We need males of P. tigrina Uhler from Hongkong, China and of P. dorceus Breddin from Celebes. Although Lundblad saw the male type of P. pamphagus from Celebes, he illustrated instead (his fig. 137, 1933) a

male specimen from Sumatra which is not *P. pamphagus*. Probably it is the male of the same species as the female he figured as B on his fig. 136. They came from the same place.

We have found that the males provide a number of useful characters for the separation of species. The shape of the pygofer, the suranal plate and the paramere are remarkably constant for a species, so is the position of the metacoxae. 21 units in the measurements of relative lengths of various structures equal to 1 mm. For the terminologies used in the description refer to pl. I.





Fic. 1. Male of *Ptilomera* (*Ptilomera*) *äello cheesmanae* Hungerford and Matsuda.

FIG. 2. Left paramere of *Ptilomera* (*Ptilomera*) sumbaensis Hungerford and Matsuda.

FIG. 3. Female abdomen of Ptilomera (Ptilomera) harpalos Schmidt.

FIG. 4. Lateral view of female seventh abdominal segment of *Ptilomera* (*Ptilomera*) sumbaensis Hungerford and Matsuda.

FIG. 5. Ventral view of female seventh abdominal segment of *Ptilomera* (*Ptilomera*) sumbaensis Hungerford and Matsuda.

Key to the Species of Ptilomera

KEY TO MALES

1.	Rear margin of metacoxa without thorn-like projection. <i>P. (Proptilomera) himalayensis</i> Hungerford and Matsuda (Himelawa), p. 414
	Rear margin of metacoxa with thorn-like projection.
2.(1)	Males. Middle femur with a fringe of hairs on its outer third at
	least
3.(2)	Paramere bifurcate. <i>P. werneri</i> Hungerford and Matsuda (Philippines), p. 511
	Paramere not bifurcate
4.(3)	Dorsolateral projections of pygofer, as seen from above, extending half their length beyond lateral wings of suranal plate. <i>P. agrioides</i> Schmidt (India), p. 431
	Dorsolateral projections of pygofer, as seen from above, much shorter, never extending half their length beyond lateral wings of suranal plate, often even shorter than lateral wings of suranal plate
5.(4)	Apical margin of pygofer broad, nearly truncate or depressed at mid- dle. Lateral margins of pygofer parallel or nearly parallel sided be- yond lateral projections
	Apex of pygofer pointed, narrowly rounded or blunt. Lateral mar- gins of pygofer beyond its dorsolateral projections more or less strongly convergent
6.(5)	Lateral wings of suranal plate well developed, reaching or extending beyond median lobe of suranal plateP. <i>chinai</i> n. sp. (Borneo), p. 438
	Lateral wings of suranal plate never reaching apex of median lobe caudally
7.(6)	Median lobe of suranal plate broad. Seen in side view venter of py- gofer medially transversely constricted. Tip of pygofer not notched. Arm of paramere broadly spatulate at tip.
	P. cingalensis Stål. (Ceylon), p. 427
	Median lobe of suranal plate not broad. Seen in side view, venter of pygofer not medially transversly constricted. Tip of pygofer notched. Arm of paramere not spatulate at tip. <i>P</i> timographic p. sp. (Timor Ist.), p. 136
8.(5)	Median lobe of suranal plate large, clearly surpassing lateral wings caudally
	Median lobe of suranal plate not large, slightly surpassing or not surpassing lateral wings caudally
9.(8)	Paramere of usual shape as shown on pls. III and IV10 Paramere long and slender as shown on plate V.
10.(9)	<i>P. sarawakensis</i> n. sp. (Borneo), p. 424 Arm of paramere as seen from the rear as shown on pl. III, figs. 3, 6.
	<i>P. laticaudata</i> (Hardwicke) (Nepal), p. 416 Arm of paramere as seen from the rear. pl. IV. fig. 6.
11 (0)	P. assamensis n. sp. (Assam), p. 421
11.(8)	As seen from below pygoter conspicuously broad beyond its mid- dle
	As seen from below pygofer not conspicuously broad beyond its mid- dle
12.(11)	Caudal half of that section of pygofer beyond its lateral projections parallel sided as seen from below. As seen laterally this distal por-
	7, <i>P. nunikanensis</i> n. sp. (Indonesian Borneo), p. 441

	Genus Ptilomera Amyot and Serville	407
13.(12)	Pygofer unusally broad beyond its dorsolateral projections, with sides converging to a dorsally directed point as shown on pl. XI, fig. 6 and pl. XII, fig. 2	
	median lobe, their rear margins longer than width of their tips. The paramere shape as shown on pl. XI, figs. 4, 7. <i>P. kirkaldui</i> n. sp. (Borneo), p.	444
	Lateral wings of suranal plate short, broad, only slightly surpassing median lobe, their rear margin not longer than the width of their tips. The paramere shape as shown on pl. XII, figs. 2, 3. <i>P. gressiti</i> n, sp. (Borneo), p.	446
14.(11)	Venter of pygofer with basal two-thirds narrow, resembling a broad keel. Sides above the keel concave to a position beyond the lateral projections of the pygofer. Venter of first genital segment with a well developed keel. (Pl. XIII, fig. 3.) <i>P. hylactor</i> Breddin (Annam), p.	448
15 (14)	Venter of genital segments not as above	
15.(14)	parallel	
	Lateral wings of suranal plate with front and rear margins not par- allel	
16.(15)	Lateral wing of suranal plate long, surpassing median lobe	
17.(16)	Median lobe of suranal plate short, but broader than width of lat- eral wing. Arm of paramere as seen in rear view with a ventral bulge or keel. (Pl. XIV, fig. 4.)	
	<i>P. breddini</i> n. sp. (New Guinea), p.	451

Median lobe of suranal plate longer than in above, but not wider than width of lateral wing. Arm of paramere as seen in rear view without the ventral bulge or keel. (Pl. XV, fig. 4.)

P. papuensus n. sp. (Papua), p. 454 18.(16) Lateral wing of suranal plate short, its rear margin a little longer than the width of its tip. (Pl. XXVIII, fig. 2.) P. oribasus Breddin (Celebes), p. 497

Lateral wing of suranal plate longer, its rear margin nearly twice as long as the width of its tip. (Pl. XVI, fig. 7.) *P. aëllo cheesmanae** n. subsp. (New Guinea), p. 459

- 19.(15) Median lobe of suranal plate plainly surpassing lateral wings....20 Median lobe of suranal plate not plainly surpassing lateral wings, 21
- 20.(19) Exposed shaft of paramere broad and short. (Pl. XXVII, fig. 5.) P. harpalos Schmidt (Sumatra), p. 493
 - Exposed shaft of paramere more slender. (Pl. XXIV, fig. 5.) P. laelaps Breddin (Čelebes), p. 488

21.(19) Lateral wings of suranal plate plainly surpassing median lobe....22 Lateral wings of suranal plate not plainly surpassing median lobe, 23

- 22.(21) Exposed shaft of paramere longer than its arm. Hind coxa reaching rear margin of fifth abdominal tergite. (Pl. XX, fig. 3.) P. sumbaensis n. sp. (Sumba Isl.), p.
 - 474 Exposed shaft of paramere not as long as its arm. Hind coxa only reaching rear margin of fourth abdominal tergite. (Pl. XXI, fig. 3.) P. maai n. sp. (Borneo), p. 476

23.(21) Lateral projection of pygofer indorsal view extending one-fifth its length beyond the lateral wing of suranal plate. Paramere long, slender, its shaft and arm in a continuous curve. (Pl. XXII, fig. 3.) P. pamphagus Breddin (Celebes), p. 478

Lateral projection of pygofer shorter. Paramere shaft and arm not

^{*} Male of P. aëllo aëllo Breddin is unknown to us.

24.(23) Distal half of that portion of pygofer beyond its lateral projections

25.(24) Ground color of body and legs dark chocolate brown, nearly black, so dark that the black markings common to all species are all but obscured, even the longitudinal black bands of the front femur. Dis-tal half of dorsum of first genital segment abnormally elevated. (Pl. XXIII, fig. 4.) Rear view of the arm of the paramere shows it straight, nearly parallel sided, and its tip rounded. (Pl. XXIII, fig. 3.) In dorsal view arm of paramere obscured by many long hairs. P. sumizome Esaki (S. O. Celebes), p. 481

Ground color of body and legs reddish orange with the characteristic black markings of the genus. Distal half of dorsum of first genital

26.(24) Lateral wings of suranal plate slightly surpassing median lobe. P. dromas Breddin (syn. P. argus Breddin) (syn. P. asbolus Breddin) (Java), p. 503

Lateral wings of suranal plate not surpassing median lobe......27 27.Arm of paramere as seen from the rear with a ventral keel as shown on pl. XXIV, figs. 4, 5. Exposed shaft of paramere longer than the Arm of paramere as seen from the rear without a ventral keel. Exposed shaft of paramere not longer than the straight arm. P. lundbladi n. sp. (Sumatra), p. 488

KEY TO FEMALES

28.(2)	Rear margin of metacoxa without thorn-like projection. Without connexival spines. P. (Proptilomera) himalayensis Hungerford and Matsuda (Hima-
	laya), p. 414
	val spines
29.(28)	With a dorsally directed protuberance on the seventh abdominal ter- gite
	Without a dorsally directed protuberance on the seventh abdominal tergite
30.(29)	Without or with only the faintest indication of a ventrolateral lobe of seventh abdominal segment
	With a ventrolateral lobe of the seventh abdominal segment, which in one species might be overlooked as a basal notch in the dorso- lateral lobe. (Pl. XII, fig. 5.)
31.(30)	Without conspicuous connexival spines. <i>P. timorensis</i> n. sp. (Timor Isl.), p. 436
	With conspicuous connexival spines
32.(31)	Base of connexival spine arising from beneath the dorsal edge of the dorsalateral lobe of the seventh segment at its base and directed medially, then caudally
	Base of connexival spine not arising as above but beyond the seventh tergite
33.(32)	Dorsolateral lobe of seventh abdominal segment short, its tip only slightly surpassing the ninth tergite when visible. <i>P. agriodes</i> Schmidt (syn. <i>P. lachne</i> Schmidt \mathcal{Q}) (S. India), p. 431

* A small male and female from Ceram Island, one of the Molluccas, ran out here but appear to be a subspecies developed on this island. See Pl. XIX. P. harpyia ceramensis n. subsp. (Ceram Isl.), p. 470.

34.(33)	Dorsolateral lobe of seventh abdominal segment long, its tip plainly surpassing ninth abdominal tergite when visible	
35.(34)	<i>P. cingalensis</i> Stål (syn. <i>P. canace</i> Schmidt) (Ceylon), p. Upper margin of dorsolateral lobe of seventh abdominal segment nearly straight. In side view appearing long	427
55.(54)	margin of dorsolateral lobe of seventh abdominal segment. <i>P. laticaudata</i> (Hardwicke) (Nepal), p. In side view connectivel spinos usually shorter flattened assist or	416
96 (99)	flattened slightly beneath dorsal margin of dorsalateral lobe of sev- enth abdominal segment	421
36.(32)	Sides of the vertically directed distal lobe of the seventh abdominal sternite not straight and parallel but curved and distally converging toward the truncate distal end.	10.1
	Sides of the usually vertically directed distal lobe of the seventh ab- dominal sternite straight and nearly parallel. (If hidden by lateral lobes runs here)	424
37.(36)	Dorsolateral lobe of seventh abdominal segment round and spine- like for its entire length as seen laterally. (Pl. XI, fig. 5.) <i>P. kirkaldyi</i> n. sp.? (Borneo), p.	444
	Dorsolateral lobe of seventh abdominal segment starts as a triangu- lar lobe to become round, slightly sigmoid and spine-like. (Pl. IX, fig. 5.)	438
38.(30)	Distal lobe of seventh abdominal sternite unusually large and not turned dorsally	446
	Distal lobe of seventh abdominal sternite smaller and usually em- braced by the lateral lobes	
39.	Seventh abdominal segment with obviously short, often broad dorso- lateral lobes. (Pl. XXV, fig. 136.)	
	dorsolateral lobes. (Pl. XXIX.)	
40.(39)	A narrow incission separating the dorsolateral and ventrolateral lobes of seventh abdominal segment	
	A wide inclusion, often shallow, separating the dorsolateral and ven- trolateral lobes of seventh abdominal segment	
41.(40)	Incission separating the dorsolateral and ventrolateral lobes of sev- enth abdominal segment very shallow. (See Lundblad's B in figure 136, pl. XXV.)P. lundbladi n. sp. (Subang Ajam, Sumatra), p.	488
42 (41)	Incission deeper	
12.(11)	Dorsolateral lobe turned obliquely downward	
43.(42)	Color dark chocolate, almost black. Genital segments as shown on pl. XXIII, fig. 6 <i>P. sumizome</i> Esqki (Southeastern Celebes), p.	481
44.(43)	Color typical for the genus	17.1
	Dorsolateral lobe of seventh abdominal segment narrow at base as	±1±
45.(42)	shown on pl. XXII, fig. 4 <i>P. pamphagus</i> Breddin (Celebes), p. In dorsal view dorsal margin of base of seventh abdominal connexi- yum nearly straight as shown on pl. XXIV fig. 1	478
	<i>P. sumatranus</i> n. sp. (Sumatra), p.	485
	In dorsal view dorsal margin of base of seventh abdominal connexi- yum short, curved outward, then inward to the base of connexival	

46.(45) Dorsal margin of dorsolateral lobe of seventh abdominal segment nearly straight or slightly concave and shorter than connexival spine. (Pl. XVI, fig. 9.) P. aëllo aëllo Breddin (New Guinea), p. 458 Dorsal margin of dorsolateral lobe of seventh abdominal segment convexly curved and longer than connexival spine. (Pl. XVI, fig. 10.) P. aëllo cheesmanae N. subsp. (Dutch New Guinea), p. 459 47.(40) Connexival spines stout, plainly shorter than seventh tergite, not half as long as upper margin of dorsolateral lobe from base of connexival spine to its tip. (Pl. XXVI, fig. 7.) *P. laelaps* Breddin (Celebes), p. 488 Connexival spines longer, at least half as long as upper margin of 48.(47) Dorsolateral lobe slender as shown on pl.XXVIII, fig. 6. Connexival spine nearly as long as upper margin of dorsolateral lobe from base of connexival spine to its tip...P. oribasus Breddin (Celebes), p. 497 Dorsolateral lobe stout as shown on pl. XXVII, fig. 7. Connexival spine half as long as upper margin of dorsolateral lobe from base of connexival spine to its tip......P. harpalos Schmidt (Sumatra), p. 493 49.(39) Dorsolateral lobe of seventh abdominal segment long, stout and straight, its upper margin from base of connexival spine to its tip nearly twice as long as connexival margin of seventh abdominal segment. (Pl. XIII, fig. 6.)..........P. hylactor Breddin (Annam), p. 448 Dorsolateral lobe of seventh abdominal segment only moderately long, its upper margin from base of connexival spine to its tip much less than twice as long as connexival margin of seventh abdominal 50.(49) Incission between the dorsolateral and ventrolateral lobes of seventh Incission between the dorsolateral and ventrolateral lobes of seventh 51.(50) Incission between the dorsolateral and ventrolateral lobes of seventh abdominal segment definitely deeper than broad, upper lobe stout. Incission between the dorsolateral and ventrolateral lobes of seventh 52,(50) Ventrolateral lobe of seventh abdominal segment faintly indicated as Ventrolateral lobe of seventh abdominal segment plainly indica-53.(52) Ventrolateral lobe of seventh abdominal segment narrow spine-like. (Pl. X, fig. 5.).....P. nunikanensis n. sp. (Indonesian Borneo), p. 441 Ventrolateral lobe of seventh abdominal segment triangular, blunt 54.(53) Incission between the dorsolateral and ventrolateral lobes very broad and shallow Ventrolateral lobe triangular. P. dromas Breddin (syn. P. argus Breddin) (syn. P. asbolus Breddin) (Java), p. 503 Incission between the dorsolateral and ventrolateral lobes not so broad and shallow. Ventrolateral lobe blunt or truncate......55 55.(54) In side view the ventrolateral lobe of seventh abdominal segment shorter than the venter of the seventh abdominal segment before it. In ventral view the ventrolateral lobe is not broad. (Pl. XXVIII, figs. 8, 9.) (The female type).....P. dorceus Breddin (Celebes), p. 501 In side view the ventrolateral lobe of seventh abdominal segment longer than the venter of seventh abdominal segment before it. In ventral view the ventrolateral lobes of types of both P. tigrina and P. harpyia are truncate at tips. However, the latter species seems

56.(55) The dorsolateral lobe rather narrow at base as shown on pl. XVII, figs. 2, 4. Ventrolateral lobes broad. As seen from below, their inner margins almost touching or overlapping and their anterior margin turned mesally..........P. tigrina Uhler (Hong Kong, China), p. 462 The dorsolateral lobe broad at base as shown on pl. XVIII, figs. 2, 5, 7, 8, 9. Ventrolateral lobes not as above.

P. harpyia Schmidt* (Cambodia), p. 466

Besides those we have keyed out above we have a female from "Oek Simakock, N. Habinsoram, Sumatra July 3, 1931 V. D. Meer Mohr" that looks like Lundblad's E in his fig. 136, and a male from the same place but on Aug. 4, 1931. They are none of the species we have keyed out. Lundblad's specimen came from Belige, W. Sumatra.

Since males are quite constant in their combination of characters and can be satisfactorily keyed out we believe that with careful study there will be recognized more species rather than fewer species in this difficult genus. In some species the females vary so slightly that they are readily keyed out but there are others that appear to be so variable that they make trouble when we try to place them in a key. We have done our best to enable one to identify the females encountered, but we are conscious of its shortcomings and have provided illustrations of all species.

Ptilomera (Proptilomera) himalayensis Hungerford and Matsuda

Plate II

- Ptilomera (Proptilomera) himalayensis Hungerford and Matsuda, Bull. Brooklyn Ent. Soc. 53(5):117-123, 2 Pls. (Described new subgenus and 1958.species from Singla Darjiling. E. Himalayas.)
- Ptilomera (Proptilomera) himalayensis Hungerford and Matsuda, Univ. Kansas Sci. Bull. 41(1):7, 17 fig. 33. (subgenus Proptilomera.) 1960.
- 1960. Ptilomera (Proptilomera) himalayensis, Matsuda, Univ. of Kansas Science Bull. 41(2):267, 537 figures 539, 609, 614, 615, 620, 624.

Redescription of subgenus Proptilomera

More primitive group of the genus Ptilomera, represented by P. himalayensis. It lacks the metacoxal thorn-like projection that is present in all other species. The seventh abdominal and genital segments of both sexes are simple and more primitive than in other species of the genus. The seventh abdominal tergite short in both sexes. First genital of male short, broad without a ventral keel. The pygofer also short and broad, lacking a distinct dorsolateral projection. Paramere simple, not divided into a shaft and arm.

^{*} A small male and female from Ceram Island, one of the Molluccas, ran out here but appear to be a subspecies evolved on this island. See Pl. XIX. *P. harpyia ceramensis* n. subsp. (Ceram), p. 470. Whether *P. tigrina* and *P. harpyia* are one variable species or distinct species must await the discovery of males of *P. tigrina* accompanied by females.

PLATE II

Ptilomera (Proptilomera) himalayensis Hungerford and Matsuda

FIG. 1. Apterous female from Kurseong, Himalayas (Brit. Mus.). Note the absence of metacoxal thorn-like spine and connexival spine.

FIG. 2. Apterous male from Kurseong, Himalayas (British Mus.). Note both the absence of metacoxal thorn-like spine and the very large first genital segment that almost covers the second genital segment.

FIG. 3. Suranal plate of the male paratype, showing the elongate median lobe and the curious hook-like wings of suranal plate.

FIG. 4. Macropterous male holotype.

FIG. 5. Macropterous female allotype. Dorsal view of caudal abdominal segments. Note the large seventh abdominal tergite and the ends of the median lobe of the seventh ventrite on either side of the anal segment.

FIG. 6. Macropterous female allotype. Side view of caudal abdominal segments to show the curious shape of the median caudal lobe of the seventh abdominal ventrite.

FIG. 7. Male holotype. Side view of caudal abdominal segments showing the curious lateral wing of suranal plate which is nearly covered by large first genital segment, the short pygofer and the erect paramere.

FIG. 8. Female allotype. Ventral view of the caudal abdominal segments. Note the median longitudinal keel on the distal lobe of the seventh abdominal ventrite and the caudolateral projections, the tips of which are shown in figure 5 above.

FIG. 9. Holotype male, ventral view of genital segments.

Fig. 10. Paratype male, side view of pygofer, suranal plate, paramere and endosoma.

PLATE II









Suranal plate not typically three lobed and entirely exposed, but hidden beneath dorsum of first genital, median lobe comprising most of the suranal plate, the lateral wings slender, not lobe-like, with only their curved tips exposed beyond the caudolateral margin of the first genital segment.

Female without connexival spines. Seventh segment without distinct dorsolateral or ventrolateral lobes on its rear margin which is straight. Median caudal lobe of seventh sternite with a distinct median longitudinal ridge, its lateral margins converging then turned obliquely outward to produce on either side a flat caudolateral projection, the ends of which are visible in dorsal view.

Description of Ptilomera (Proptilomera) himalayensis

Size: Male holotype (macropterous): Length including wings 14.4 mm.; width of head 1.64 mm.; width of anterior lobe of pronotum 2.1 mm.; width across humeri 2.8 mm.; greatest width of body across mesoacetabula 3.48 mm.

Female allotype (macropterous): Length including wings 14.44 mm.; width of head 1.68 mm.; width of anterior lobe of pronotum 1.93 mm.; width across humeri 2.81 mm.; greatest width of body across mesoacetabula 3.90 mm.

Male (apterous): Length 10.48 mm.; width of head 1.7 mm.; width of pronotum 2.00 mm.; length of mesonotum 2.80 mm.; greatest width of body across mesoacetabula 3.48 mm.

Female (apterous): Length 12.48 mm.; width of head 1.83 mm.; width of pronotum 2.05 mm.; length of mesonotum 2.95 mm.; greatest width of body across mesoacetabula 4.05 mm. We have seen a macropterous male that is 15.5 mm. long including wings, and an apterous male only 10.1 mm. long.

Color: Apterous forms have the color and pattern typical for the genus except that the black band on the side of the mesothorax is narrower, undulate, and not divided. Mesothorax with a lateral black band, broader in front, and reaching back onto metacetabula; mesoacetabula with a black spot. Venter pale testaceous, covered with short silvery pile. Abdominal tergites of deälated male with black bands covered with silvery pile across bases of first four segments. Antennae brown. Legs testacenes to reddish brown; anterior femora with two longitudinal reddish brown bands; middle and hind femora pale testaceous at tips.

The macropterous forms: reddish brown to testaceous above, wings brown. Head with two or more indefinite embrowned spots. Prothorax with a black spot on anterior median margin, a transverse

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band on anterior margin of posterior lobe broken in the middle by a low testaceous carina; sides of anterior lobe with a longitudinal dark band not reaching to eyes and a large spot in proacetabula.

Structural Characteristics: Relative length of antennal segments of male holotype. 1st:2nd:3rd:4th::125:30:44:25, of the female allotype, 1st:2nd:3rd:4th::115:27:40:?. The last segment of the holotype somewhat curved and flattened.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male (holotype)	7.43 mm.	6.19 mm.	2.85 mm.	1.42 mm.
Male (apterous)	6.81 mm.	5.71 mm.	2.76 mm.	1.29 mm.
Female (allotype)	6.29 mm.	5.24 mm.	2.38 mm.	1.24 mm.
Female (apterous)	6.67 mm.	5.71 mm.	2.52 mm.	1.29 mm.
Middle leg	Femur	Hind leg		Femur
Male (holotype)	19.50 mm.	Male (holo	type)	. 25.37 mm.
Male (apterous)	19.05 mm.	Male (apte	rous)	. 22.60 mm.
Female (allotype)	16.90 mm.	Female (al	lotype)	. 19.60 mm.
Female (apterous)	17.14 mm.	Female (aj	pterous)	. 20.48 mm.

In the hind leg of the deälated Male paratype which is larger than the holotype, the femur is 28.09 mm. long. The front femur of the male is rather stout and has a characteristic shape. The front femur of female is normal in shape and provided with a small black protuberence ventrally near distal end. This protuberence is larger in the male. Tibia of front leg also has three small protuberences on its inner base; these protuberences are smaller in female than in male. Male middle femur with densely ciliated ventral margin confined to distal two-fifths; basal three-fifths bare; metacoxal spine represented by a blunt black protuberance. Length of pregenital segments:genital segments::60:30. Seventh abdominal tergite of male short, not longer than the fifth and sixth together. Male genital segments: first genital segment broad and short; without a ventral keel. Suranal plate small. In normal position almost entirely hidden, its median lobe obscured by the dorsum of first genital, its lateral lobes slender and hidden except for their tips. (See Plate II fig. 3.) Pygofer simple, short and broad, without dorsolateral projections of all other species. Paramere as shown on Plate II fig. 10.

Female. Length of thorax:abdomen::102:99. Seventh abdominal segment is also simple and quite primitive. Seventh abdominal tergite short, only slightly longer than sixth, without connexival spines. In dorsal view the black projection one on each side near the caudal apex of the insect are the tips of prolongations of the seventh sternite, which in other species of *Ptilomera* is a single flap that is nearly truncate across its end. In side view there are only slight indications of lateral lobes so striking in other species of this genus.

Types: The macropterous male holotype, macropterous female allotype and a deälated male paratype bear the label "Singla Darjiling, E. Himalayas June 13. 1500 ft. Ld. Carmechael" in the Francis Huntington Snow Coll., The University of Kansas.

Distribution: In addition to the types we have seen the following:

"Mungphu" 2 macropterous males (British Mus.); "Ind Mus. Kurseong Alt. 3200 ft. E. Himalayas. 2, 6. III-10. F. Gravely." apterous male and female. (British Mus.); "N. India" 1 deälated male. (British Mus.) "Sikkim, Gopaldhara, Rungbong Vall. H. Stevens." two apterous male, one apterous female. (British Mus.). These British Museum specimens bear a manuscript name, "*Ptilomera primitiva* Lundblad" and were seen there by the junior author (1960) who recognized them as our *Ptilomera* (*Proptilomera*) *himalayensis* Hungerford and Matsuda and were borrowed so that we could describe the apterous forms. It is evident that Dr. Lundblad before 1933 recognized that this is a primitive species and his name would have been more meaningful than our own.

Ptilomera (Ptilomera) laticaudata (Hardwicke)

Plate III

- 1825. Gerris laticaudata Hardwicke, Trans. Linn. Soc. 14:134 Tab. VI figs. 1-4. (Described from "Nepaul". His figure 2 is an adult male not a nymph and figure 4 incorrectly drawn. Types in British Museum.)
- 1843. Ptilomera laticauda (Hardwicke), Amyot et Serville Hem. 413-414. P. VIII fig. 3. (Described the genus but misspelled laticaudata and added Java in error.)
- 1853. *Ptilomera laticauda*, Herrich-Schäffer, Wans. Ins. 9:65 fig. 940. (Unknown to him but copied from Amyot and Serville).
- 1866. Ptilomera laticauda, Mayr, Novara-Exped. Zool. Theil Bd. 2(1):177. (Followed Amyot and Serville in making P. cingalensis Stål a synonym and questioned P. tigrina Uhler).
- 1900. Ptilomera laticaudata, Horváth, Semon Zoologische Forschungsreisen in Australien und dem Malayischen Archipelagos, Denkschriften VIII 639, (Reports from Buitenzorg, Java. Surely not above species).
- 1904. Ptilomera laticaudata, Distant, Fau. Brit. Ind. Rhynch. 2:185. (Only first three references above apply to this species. He was in error in making synonyms of *P. cingalensis* Stål and *P. tigrina* Uhler. His figure 133 is not of *P. laticaudata* (Hardw.) and the drawing he labeled female is a male which looks like *P. agriodes* Schmidt).
- 1927. Ptilomera laticaudata, Esaki, Eos, Rev. Esp. Ent. 3(3):258 (questions all distributional records except Nepal).
- 1933. Ptilomera laticaudata, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 373, 418, 422-423. fig. 133. (Saw and redescribed the type and gave drawings of male genitalia).

- 1958. *Ptilomera laticaudata*, Hungerford and Matsuda, Bull. Brooklyn Ent. Soc. 53(5):117-118, Pl. I, Pl. II G-H. (Described and figured female and thought this to be this species.)
- 1960. Ptilomera laticaudata, Matsuda, Univ. of Kansas Sci. Bull. 41(2):267, 269, 537, 541, (Fig. 619 on p. 537 not laticaudata). The following references are misdeterminations:
- 1892. Ptilomera laticaudata, Kirby, Linnean Soc. Jour. Zool. 24:124. (Not P. laticaudata (Hardw.) but P. cingalensis Stål.)
- 1899. Ptilomera laticaudata, Kirkaldy, Ann. Soc. Ent. Belg. 43:508. (Recorded a female from "S. Celebes, Samanga. (Fruhstorfer Nov. '95.)" In Kirkaldy Collection we find 3 8 8 and 2 9 9 from this place. They are P. laelaps Breddin).
- 1901. Ptilomera laticaudata, Breddin, Abh. Naturf. Ges. Halle Bd. 24:20. (Quoted Kirkaldy as 1899.)
- 1918. Ptilomera laticaudata, Paiva, Records of Indian Museum 14:24 (Probably P. agriodes Schmidt.)
- 1919. *Ptilomera laticaudata*, Paiva, Records of Indian Museum 16, Pt V, No. 23, 365.

For more than one hundred years this species from Nepal remained indistinguishable in the literature. Then in 1933 Dr. Lundblad saw the types, an apterous male and a macropterous male with broken wings, in the British Museum. He redescribed the types and gave drawings of the male genitalia. In 1958 we described a lone female from Darjiling, just east of Nepal that we thought might be the female of *P. laticaudata* (Hardw.) but stated that the determination could not be certain until both sexes were taken together from one place. Now we have found, in the Collection of the British Museum, one male and two females from Sikkim. The females are like our neallotype of *P. laticaudata* from Singla, Darjiling, East Himalayas and the male is like the two male types of *P. laticaudata* in the British Museum. Therefore, we now know both sexes of *P. laticaudata* (Hardwicke). A closely related species from Assam is described after this species.

Size: Although Hardwicke gave the length of this species as eleven lines, Lundblad (1933) said the type male is relatively small and around 14 mm. long. Since the genitalia in both male types have now been removed and the identification confirmed, we accept the length given by Lundblad. Mr. Izzard of the British Museum has obligingly sent us the following measurements: Width across the head including eyes 2.73 mm.; width of pronotum 2.73 mm.; length of mesonotum (apterous form) 3.73 mm. Our neallotype was also described without some of the measurements we are giving in this paper. Here we give them for the Female. Length 14.19 mm.; width of head 1.95 mm.; width of pronotum 2.24 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesoacetabula 3.95 mm. Ptilomera (Ptilomera) laticaudata (Hardwicke)

FIG. 1. Male from Sikkim. Compared with type of Ptilomera laticaudata.

FIG. 2. Male. Ventral view of genital segments of the above specimen from Sikkim.

FIG. 3. Rear view of right arm of paramere of *P*. (*Ptilomera*) *laticaudata* (Hardwicke) from Sikkim.

FIG. 4. Female neallotype of *Ptilomera laticaudata* by Hungerford and Matsuda.

FIG. 5. Female neallotype, dorsal view of sixth and seventh abdominal segments.

FIG. 6. Male. Paramere of a type drawn from a slide mount by Matsuda at the British Museum.

FIG. 7. Male type. Suranal plate drawn from a slide mount by Matsuda.

FIG. 8. Female neallotype. Side view of sixth and seventh abdominal segments.

PLATE III



Color: Typical for the genus. However, all three females known to us have four black dots on the vertex.

Structural characteristics: The male types now lack antennae. However, if Hardwicke's fig. 3 is correctly drawn then the relative length of antennal segments of the Male are 1st:2nd:3rd:4th::34:10: 12:7+. Those of our neallotype 125:25:37:?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male type *	7.33 mm.	5.20 mm.	3.66 mm.	1.66 mm.
Female neallotype				
(apterous)	6.57 mm.	$5.62 \mathrm{mm}$.	3.00 mm.	
Female Sikkim,				
(apterous)	6.76 mm.	5.81 mm.	3.43 mm,	1.52 mm.
Middle leg	Femur	Hind leg		Femur
Male type *	25.00 mm.	Male type *		30.00 mm.
(apterous)	17.14 mm.	Female neal	lotype	
Female Sikkim,		(apterous)	20.00 mm.
(apterous)	18.19 mm.	Female Sikk	im,	
· · · /		(apterous)	20.38 mm.

Length of pregenital abdominal segments: Genital segments::73: 57 (from Sikkim). Male genital segments: Suranal plate with median lobe very broad but short, not as long as the distal width of a lateral wing, yet surpassing the latter caudally (unlike the drawing in Hardwicke's Fig. 4). Front and rear margins of lateral wings not parallel. Pygofer relatively short, its tip bluntly pointed, dorsolateral projections stout, short and bluntly rounded at tip. Paramere in dorsal view slightly sigmoid, the union of shaft and arm indistinct. In rear view the dista half of arm as shown in Lundblad's figure 133 and as fig. 3 of Plate III.

Female neallotype. Length of thorax:Abdomen::120:136. Seventh abdominal tergite with rear margin not appearing broadly rounded. Base of connexival spine arising from beneath the dorsal edge of seventh connexivum, the transverse base of connexival spines overlapping the rear margin of seventh abdominal segment on either side. Connexival spines long, their tips attaining the tips of dorsolateral lobe. Where the transverse base of the spine turns caudally the spine turns obliquely upward for about one-third of its length before turning caudally. Without or with only the faintest indication of a ventrolateral lobe of the seventh abdominal segment. Dorsolateral lobe of seventh abdominal segment long, its upper margin nearly straight.

^{*} Measurements of the male type were made by Mr. R. J. Izzard of the British Museum.



Fig. 133. Ptilomera laticaudata H a r d w. ♂. A Genitalkapsel von oben; B linker Genitalgriffel; C Griffelende von der Spitze aus gesehen; D Analplatte. Nach der Type aus Nepal.

FIG. 1. Dr. Lundblad permitted us to use this figure which illustrates the male genital characters of one of the types in the British Museum.

Comparative notes: We have long considered some specimens from Assam as this species. However, we now can separate both sexes of it from *P. laticaudata* (Hardw.) and regard the specimens from Assam as a new species.

Types: Two male types from Nepal are in the British Museum. One neallotype from "Singla Darjiling, E. Himalayas, June 13, 1500 ft. Ld. Carmichael" is in the Torre-Bueno Collection at K. U.

Distribution: In addition to the above we have seen two females and one male bearing the label "Sikkim, Gopaldhara, Rungbon. Vall. H. Stevens." These are like the neallotype above and are in the British Museum.

Ptilomera (Ptilomera) assamensis n. sp.

Plate IV

Size: Male, (apterous): Length 13.8 mm.; width of head 2.00 mm.; width of pronotum 2.33 mm.; length of mesonotum 3.29 mm.; greatest width of body across mesoacetabula 3.81 mm.

Female (apterous): Length 14.29 mm.; width of head 2.05 mm.; width of pronotum 2.19 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesoacetabula 3.90 mm. As we have stated in "Taxonomic Problems Involved," we will not hereafter give figures or size variation, but the following will illustrate the problem by this species. Length of apterous males ranges from 13 to 15 mm.; width of head 1.85 to 2.00 mm.; width of prothorax 1.97-2.27 mm.;



Ptilomera (Ptilomera) assamensis n. sp.

FIG. 1. Female, dorsal view.

- FIG. 2. Female, dorsal view of sixth and seventh abdominal segments.
- FIG. 3. Male, ventral view of genital segments.

FIG. 4. Male, dorsal view.

FIG. 5. Female, ventral view of sixth and seventh abdominal segments.

FIG. 6. Arm of right paramere as seen from the rear.

FIG. 7. Female, dorsal view of sixth and seventh abdominal segments. This specimen has a hand written label "Karwapam." Its connexival spines are unusually long.

FIG. 8. Female, an oblique view to show the flat lying connexival spines.

FIG. 9. Female, side view of sixth and seventh abdominal segments.

greatest width of body across mesoacetabula 2.73-3.81 mm. Length of apterous females ranges from 13.90-14.88 mm.; width of head 1.89 to 2.05 mm.; width of prothorax 1.87-2.14 mm.; greatest width of body across mesoacetabula 3.36 to 3.99 mm.

There are other species with even greater variations in size.

Color: Ground color yellowish to reddish brown, abdominal tergites, except the last one, may be black in the males or brown with only the lateral margins and intersegmental lines black, connexivum brown. Clypeus black, two narrow black converging lines on vertex. Anterior median margin of pronotum with two black spots or a continuous connecting line between them behind the interocular space. Anterior margin of mesonotum with a lateral black spot on either side. Sides of mesothorax usually with two longitudinal undulate dark bands separated by a band of silvery pile above a yellow streak. The upper band black, the lower one dark brown and sometimes incomplete. Venter pale yellow, covered by a short silvery pile. Antennae, front tibia and tarsus dark brown. Front femur with three dark brown to black longitudinal bands; legs elsewhere light brown.

Structural characteristics: Relative length of antennal segments. Most specimens have lost at least the last two segments. There is a male in the British Museum labeled "Assam, W. F. Badgley 1906-185." This has the left antenna entire and measures: 1st:2nd:3rd: 4th::175:37.5:55:32.5. and a female from the same place with the right antenna entire, 1st:2nd:3rd:4th::132.5:28.5:43:28.5.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male	8.33 mm.	7.14 mm.	3.86 mm.	1.81 mm.
Female	7.38 mm.	6.33 mm.	3.71 mm.	$1.52 \mathrm{mm}$.
Middle leg	Femur	Hind leg		Femur
Male	21.66 mm.	Male		27.38 mm.
Female	19.87 mm.	Female		22.97 mm.

Male. Length of pregenital abdominal segments:Genital segments::77:48. Genital segments: Suranal plate with median lobe broad, but as long as or longer than the distal width of a lateral wing and more obviously surpassing the lateral wings caudally than in *P. laticaudata* (Hardw.); front and rear margins of lateral wings not parallel. Pygofer relatively short, its tip roundly pointed, its dorsolateral projections short and broad at base as seen ventrally. Paramere with much of its shaft hidden beneath the median lobe, its exposed part superficially resembling that of *P. laticaudata*. However, the distal half of the arm as seen from the rear lacks the definite constriction that Lundblad showed for P. *laticaudata* (Hardw.).

Female. Length of thorax:Abdomen::121:143. Seventh abdominal tergite with rear margin appearing broadly rounded and much shorter than the sixth tergite. Base of connexival spine arising from beneath the base of seventh connexivum as a swelling that leaves no connexival edge. The obliquely turned base of connexival spine but slightly overlaps the caudolateral edge of the seventh tergite, then turns caudally and lies flat to its tip which seldom reaches tip of dorsolateral lobe. Without or with only the faintest indication of a ventrolateral lobe of the seventh abdominal segment. Dorsolateral lobe of seventh abdominal segment long but not a straight line.

Comparative notes: A close relative of *P. laticaudata* but separated from it as shown in the key.

Types: Male holotype and female allotype and one male and one female paratype from "Assam. W. F. Badgley 1906" and one female paratype "Karwapaui 1907" are in the British Museum. We have in the K. U. Collection the following paratypes: $4 \overset{\circ}{\mathcal{J}}$, $3 \overset{\circ}{\mathcal{Q}}$ from "Assam, India," and $3 \overset{\circ}{\mathcal{J}}$ and $1 \overset{\circ}{\mathcal{Q}}$ labeled "Assam" that came to us in the Kirkaldy Collection.

Distribution: Known only from the type localities.

Ptilomera (Ptilomera) sarawakensis n. sp.

Plate V

Size: Male holotype (apterous). Length 16.19 mm.; width of head 2.38 mm.; width of pronotum 2.48 mm.; length of mesonotum 3.76 mm.; greatest width of body across mesoacetabula 4.19 mm.

Female allotype (apterous). Length 17.71 mm.; width of head 2.29 mm.; width of pronotum 2.38 mm.; length of mesonotum 3.90 mm.; greatest width of body across mesoacetabula 4.48 mm.

Male (macropterous). Length with wings 17.38 mm.; width of head 2.29 mm.; width across humeri 3.33 mm.; greatest width of body across mesoacetabula 3.86 mm.

Female (macropterous). Length of body without wings 16.90 mm.; width of head 2.19 mm.; width across humeri 3.05 mm.; greatest width of body across mesoacetabula 3.86 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male holotype 1st:2nd:3rd:4th::180:40:59:37.

Female allotype 1st:2nd:3rd:4th::162:35:48:38.

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Ptilomera (Ptilomera) sarawakensis n. sp.

FIG. 1. Female allotype, dorsal view.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype, dorsal view. Note the long first genital segment, the median lobe of suranal plate and the long parametes.

FIG. 4. Female allotype, ventral view of thee sixth and seventh abdominal segments.

FIG. 5. Female allotype, side view of sixth and seventh abdominal segments.

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male	9.42 mm.	8.24 mm.	4.76 mm.	1.86 mm.
Female	8.91 mm.	7.71 mm.	$5.1 { m mm}$.	
Middle leg	Femur	Hind leg		Femur
Male	26.1 mm.	Male		30.48 mm.
Female	23.47 mm.	Female		27.86 mm.

Actual Lengths of Leg Segments

Male. Length of pregenital abdominal segments:Genital segments::87:67. Suranal plate with median lobe rather broad and extending caudally beyond the short lateral wings which have their front and rear margins not parallel. Pygofer of usual shape. Dorsolateral projections, as seen from below, broad at base but nearly pointed; as seen from above about as long as lateral lobe of suranal plate. Paramere long, shaft and arm not distinguishable. See plate 5, fig. 2.

Female. Length of thorax:Abdomen::145:180. Seventh abdominal tergite nearly as long as sixth tergite (18.5:17.8). Connexival spine moderately short, arising from end of the curved edge of the seventh connexivum, thus the connexival spines have a tendency to cross each other, without or with only the faintest indication of a ventrolateral lobe of seventh segment; dorsolateral lobe of seventh abdominal segment long. Sides of the vertically directed distal lobe of seventh abdominal sternite not straight and parallel, but curved and distally converging toward the truncated distal end.

Comparative notes: This species runs out with *P. laticaudata* (Hardw.) in both keys to the sexes, couplet 9 for males and couplet 32 for females.

Types: Holotype apterous male, allotype apterous female bear the label "Sarawak:Mt. Dulit R. Koyan 2500 ft. Primary Forest Nov. 13, 1932." "On surface of fast water." Also a macropterous male bearing the above label; a macropterous female from the above locality but taken at 850 ft. on Aug. 22, 1932; an apterous female taken "skating on slow moving water at the junction of Tinjar and Lejok rivers at foot of Mt. Dulit Aug. 15, 1932; another apterous female "on fast parts of stream on Dulit Trail Aug. 16, 1932." All of the above are labeled "paratypes" and were taken by B. M. Hobby and A. W. Moore on the Oxford Univ. Exp. The types are in the British Museum.

Distribution: Known only from the above type localities. The finding of a specimen "on slow moving water" is only known such record. *Ptilomera* are usually recorded from fast moving water as were the other specimens of this type series.

Ptilomera (Ptilomera) cingalensis Stål

Plate VI

- 1855. *Ptilomera cingalensis* Stål, Öfvers af K. Vet. Akad. Förh. 12, 190 (Described from "Ins. Taphrobana" an ancient name of Ceylon).
- 1927. Ptilomera cingalensis, Esaki, Eos Rev. Esp. Ent. 3(3):259.
- 1933. Ptilomera cingalensis, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 373, 421.
- 1933. Ptilomera canace Schmidt, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12: 372, 373, 421 (Says is a synonym of *P. cingalensis* Stål, with which we agree).
- 1960. Ptilomera cingalensis, Matsuda, Univ. Kansas Sci. Bull. 41(2):267.
- Since *P. canace* Schmidt 1926 is a synonym of *P. cingalensis* Stål 1855 the following references belong here:
- 1926. Ptilomera canace Schmidt, Ent. Mitt. 15(1):65 (Described male and female from Ceylon).
- 1927. Ptilomera canace, Esaki, Eos Rev. Esp. Ent. 3(3):259.
- 1960. Ptilomera canace, Matsuda, Univ. Kansas Sci. Bull. 41(2):267, 539 fig. 626.

Dr. Lundblad found the type, a female in the Riksmuseet in Stockholm and also a male that Stål did not describe. However, Lundblad did not describe either sex but stated that it is a species that can be recognized as such. We have not seen the type of *P. cingalensis* but since Lundblad placed *P. canace* Schmidt as a synonym of *P. cingalensis* Stål (they both came from Ceylon) and we have studied four types of *P. canace* Schmidt (1 male and 1 female with their genital segments mounted on slides and two others). We know our specimens from Ceylon are *P. cingalensis* and offer the following description of the species.

Size: This ceylonese species is indeed variable in size. The males ranging from 12.14 mm. to 16.66 mm. in length, and females from 12.0 mm. to 15.0 mm. The pair we have chosen from our Kirkaldy Collection have the following measurements:

Male (apterous): Length 16.66 mm.; width of head 2.40 mm.; width of pronotum 2.67 mm.; length of mesonotum 3.43 mm.; greatest width of body across mesoacetabula 4.38 mm.

Female (apterous): Length 14.0 mm.; width of head 2.1 mm.; width of pronotum 2.1 mm.; length of mesonotum 2.9 mm.; greatest width of body across mesoacetabula 3.86 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments: Male from Pundaluoya, Ceylon, 1st:2nd:3rd4th::160:40:50:34.

Female from Pundaluoya, Ceylon, 1st:2nd:3rd:4th::138:32:41:30. The male type of *P. canace* Schmidt has only two basal antennal segments: 1st:2nd::154:40. One of our males from Pundaluoya,

Ptilomera (Ptilomera) cingalensis Stål

FIG. 1. Female from Pundaluoya, Ceylon. Dorsal view.

FIG. 2. Male from Pundaluoya, Ceylon. Ventral view of genital segments.

FIG. 3. Female from Pundaluoya, Ceylon. Ventral view of sixth and seventh abdominal segments.

FIG. 4. Male from Pundaluoya, Ceylon. Dorsal view. Note carefully the shape of suranal plate, caudal end of pygofer and shape of paramere.

FIG. 5. Right side view of genital segments of above male.

FIG. 6. *Ptilomera canace* Schmidt, female type. Dorsal view of seventh abdominal segment drawn from the slide mount.

FIG. 7. *Ptilomera cingalensis* Stål. Female from Pundaluoya, Ceylon. Left side view of sixth and seventh abdominal segments.

FIG. 8. *Ptilomera canace* Schmidt. Male type. Last genital segment drawn from the slide mount.

PLATE VI



Ceylon with only two basal segments 1st:2nd::178:43 which shows a considerable variation.

Actual Lengths of Leg Segments (Pair from Pundaluoya, Ceylon)

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male	9.43 mm.	8.19 mm.	4.95 mm.	1.81 mm.
Female	$7.00 \mathrm{mm}.$	6.24 mm.	$3.57 \mathrm{mm}.$	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Male	25.47 mm.	Male		33.81 mm,
Female	19.19 mm.	Female		21.67 mm.

The measurements of the types of *P. canace* Schmidt are as follows:

Male (apterous): Length without genital segments 11.76 mm.; width of head 2.38 mm.; width of pronotum 2.57 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesoacetabula 3.90 mm.

Female (apterous). Length 13.0 mm.; width of head 2.05 mm.; width of pronotum 2.05 mm.; length of mesonotum 2.86 mm.; greatest width of body across mesoacetabula 3.67 mm.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	Ist tarsal segment	2nd tarsal segment
Male	9.19 mm.	7.67 mm	4.76 mm.	
Female	7.14 mm.	6.19 mm.	2.95 mm.	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Male	24.76 mm.	Male		31.90 mm.
Female	19.05 mm.	Female		22.38 mm.

Male. Length of pregenital abdominal segments: Genital segments::80:77. Suranal plate with median lobe broad, surpassing lateral wings caudally; lateral wings short, their anterior and posterior margins not parallel. Pygofer with its dorsolateral projection stout, slightly before its middle, and about as long as lateral lobes of the suranal plates as seen from above; apical margin of pygofer broad, truncate; lateral margins of pygofer beyond lateral projections parallel or nearly parallel as seen from below; as seen from the side ventral line of pygofer medially curved upward, making a constriction. Paramere as seen from above with most of its shaft hidden by median lobe of suranal plate, its arm turned laterad and its tip spatulate and broad. Distal part of dorsum of first genital segment but slightly elevated as seen in side view, its venter transversely constricted.

Female. Length of thorax: Abdomen::114:135. Seventh abdominal tergite much shorter than sixth. Connexival spine long, arising

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from base of connexivum of seventh segment, turned medially and then caudally as a long spine. Dorsolateral lobe of seventh abdominal segment long, its tip plainly surpassing ninth abdominal tergite when visible. Upper margin of dorsolateral lobe of seventh abdominal segment definitely curved. In side view appearing short, without or with only the slightest indication of ventrolateral lobe.

Comparative notes: The males of this species have the apical margin of the pygofer broad as do *P. chinai* and *P. timorensis* from which they are separated as shown in the key. The females have the base of connexival spine arising from beneath the dorsal edge of the dorsolateral lobe of the seventh segment at its base and directed medially then caudally. This is true of *P. agriodes* Schmidt and *P. laticaudata* Hardwicke from which they are separated as shown in our key couplet 31.

Types: The type of *P. cingalensis* Stål is in the Riksmuseet at Stockholm, Sweden. The types of *P. canace* Schmidt, one male and three females are now in the Polish Academy of Sciences in Warsaw.

Distribution: The type of both *P. cingalensis* Stål and *P. canace* Schmidt came from Ceylon without a definite locality. We have before use the following:

"Ceylon, Pundaluoya Ap. '98 (from rocky stream)" 1 3;

"Ceylon, Pundaluoya May '97 (from rocky stream)" 1 9;

"Ceylon, Pundaluoya, Aug. '97 (from rocky stream)" $4 \eth \eth$, $3 \circlearrowright \circlearrowright$. The above is from the Kirkaldy Collection, University of Kansas. "Ceylon, Suduganga River, Matale R. A. Senior-White" $1 \circlearrowright$ (Torre-Bueno Collection, K. U.); "Ceylon, Pitamba Ela Jan. 26, 1958, K. L. A. Perera" $1 \eth 2 \circlearrowright \circlearrowright ;$ "Ceylon, Nindoma, Jan. 27, 1958 K. L. A. Perera" $3 \circlearrowright \circlearrowright (K. U.)$.

Ptilomera (Ptilomera) agriodes Schmidt

Plate VII

1926. Ptilomera agriodes Schmidt, Ent. Mitt. 15(1):63-4.

- 1927. Ptilomera agriodes, Esaki, Eos Rev. Esp. Ent. 3(3):259.
- 1933. Ptilomera agriodes, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:371, 373, 421.
- 1933. Ptilomera lachne Schmidt, Lundblad, Arch. Hydrobiol Suppl. 12:372, 373, 419 (Said is female of P. agriodes Schmidt).
- 1960. Ptilomera agriodes, Matsuda, Univ. Kansas Sci. Bull. 41(2):267, 537 fig. 612,613 (wings) fig. 618 (hind tarsus showing two segments that are fused).

Since P. lachne Schmidt is a synonym, the following references also go here.

- 1926. Ptilomera lachne Schmidt, Ent. Mitt. 15(1):64 (Described female from Tranquebar, S. India).
- 1927. Ptilomera lachne, Esaki, Eos Rev. Esp. Ent. 3(3):259.
- 1960. Ptilomera lachne Matsuda, Univ. Kansas Sci. Bull. 41(2):267.

PLATE VII

Ptilomera (Ptilomera) agriodes Schmidt

FIG. 1. Female from Anamalai Hills, S. India. Dorsal view.

FIG. 2. Male from S. India, ventral view of genital segments. Note the large elongate dorsolateral projections of the pygofer.

FIG. 3. Caudal portion of pygofer of above male seen from the left side.

FIG. 4. Dorsal view of above male. Note the shape of suranal plate, the dorsally turned up tip of pygofer, the huge dorsolateral projections of pygofer and the more slender curved parameres.

FIG. 5. Female of figure 1. Ventral view of sixth and seventh abdominal segments. This does not show the true shape of the distal median lobe of the seventh ventrite.

FIG. 6. Male type of *P. agriodes*. Drawing made of the second genital segment in a slide mount.

FIG. 7. Female of figure 1. Abdominal end as seen from the rear to show the true shape of the distal median lobe of the seventh ventrite.

FIG. 8. The seventh abdominal segment of *P. lachne* Schmidt type, drawn from a slide showing right side.

FIG. 9. Shows the sixth and seventh abdominal segments of a female of *P. agriodes* Schmidt seen from left side.
PLATE VII



Redescription based on an apterous male type from Trichinopoli, South India, and on apterous female type of *P. lachne* Schmidt from Tranquebar, S. India.

Size: Male (apterous): Length 17 mm.^{*}; width of head 2.57mm.; width of pronotum 3.1 mm.; greatest width of body across meso-acetabula 5.0 mm.

Female (apterous). Length 14.00 mm.; width of head 2.33 mm.; width of pronotum 2.52 mm.; length of mesonotum 3.33 mm.; greatest width of body across mesoacetabula 4.52 mm.

Color: Quite typical for the genus. Ground color brown with usual black markings. Side of thorax with a black longitudinal band that is divided by a reddish yellow undulate line leading forward from mesothoracic spiracle.[†] Venter covered by a silvery pile. Antennae black, with last two segments more or less covered by a silvery pile. Legs dark brown. Front femur with a black longitudinal band on each side, its venter dark brown but more or less covered with a silvery pile. Tibia and tarsus nearly black but covered also with a silvery pile. Middle and hind legs dark brown, with distal end of tibia and tarsus light brown and covered with silvery pile.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::175:40:50:36.4. Female: 1st:2nd:3rd:4th::144:30:40:31.

Relative Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male	9.52 mm.	8.24 mm.	5.00 mm.	2.05 mm.
Female	$8.19 \mathrm{mm}.$	6.81 mm.	3.95 mm.	1.76 mm.
Middle leg	Femur	Hind leg		Femur
Male	24.29 mm.	Male		29.76 mm.
Female	21.33 mm.	Female	· · · · · · · · · · · · ·	23.81 mm.

The front femur of male rather stout, 1.47 nm. in diameter, with usual incised place on under side of distal end that is smooth and shiny, with two black shiny transverse protuberances near its middle and at its base a conical less prominent tubercle. Front tibia also has at its inner base a similar incised area with three black shiny elevations, it is rather stout, as wide as middle femur (0.76 mm.); tarsus much more slender, outer lobe of terminal cleft of second tarsal segment much shorter than inner lobe. Middle femur stouter but shorter than hind femur. More than distal half of middle femur

Length as given by Schmidt in his description. We found that the genital segments of all types had been removed and cleared and mounted in balsam.
 † This yellow line is usually obscured by a band of silvery hairs.

with a dense brush of long hairs; basal part of middle femur with short inconspicuous hairs. Metasternum of male short, subequal to first two visible abdominal ventrites ° together; of female metasternum subequal to first visible abdominal ventrite.

Male. Length of pregenital segments:Genital segments::102:70. Suranal plate with median lobe broadly rounded, its caudolateral margins undulate and extending caudally far beyond short lateral wings, lateral margins of which are nearly parallel, with caudolateral corner of wings slightly protruded. Pygofer with dorsolateral projections that surpass lateral wings of suranal plate by half their length, their tips pointed and turned caudally, caudal end of pygofer as seen from above broadly rounded, as seen from side or rear turned up and pointed. Paramere long, its arm curved laterally and its tip pointed and turned forward.

Female. Length of thorax:Abdomen::136:176. Seventh abdominal tergite a little longer than sixth tergite. Connexival spine arising beneath incured edge of connexivum, turned medially then caudally, its tip reaching caudal end of dorsolateral lobe that is short, broad and directed obliquely downward. Ventrolateral lobe very slightly developed. Distal lobe of seventh sternite turned dorsally and exposed, with a median longitudinal carina, its lateral margins slightly converging caudally and its tip or distal edge transverse and slightly concave as seen from rear.

Comparative notes: The long dorsolateral projections of pygofer separate this species from all others. The female has the base of the connexival spine arising from beneath the connexival edge of the seventh abdominal segment near its base. The dorsolateral lobe of seventh abdominal segment short, its tip only slightly surpassing ninth tergite when visible, and this separates it from *P. cingalensis* which has the dorsolateral lobe of seventh abdominal segment long.

Types: The type of *P. agriodes* Schmidt is an apterous male from Trichinopoli, South India and the type of *P. lachne* Schmidt is an apterous female from Tranquebar. Both are now in the Polish Academy of Sciences in Warsaw, Poland.

Distribution: We have both males and females from a single place in South India that are like types. Besides the type we have seen the following: "South India Feb. 1955 P. S. Nathan" "Shovaroy Hill, Nagalur 4000 ft." $5 \circ \circ$ (deälated) K. U. Coll.; "South India Feb. 1955 P. S. Nathan" "Shovaroy Hill, Yorcaud 4500 ft." $1 \circ \sigma$ deälated), 8 apterous $\circ \circ \sigma$, 9 macropterous $\circ \circ \circ$ (K. U. Coll.);

^e The first abdominal ventrite is absent in this genus.

"South India Anamalai Hills, Cinchona 3500 ft. Apr. 1957 P. S. Nathan" 4 macropterous $\mathcal{J} \mathcal{J}$, 4 macropterous $\mathcal{Q} \mathcal{Q}$; 9 $\mathcal{J} \mathcal{J}$, 18 $\mathcal{Q} \mathcal{Q}$ (deälated); 3 $\mathcal{J} \mathcal{J}$ and 13 $\mathcal{Q} \mathcal{Q}$ (apterous) (K. U. Coll.). From the same locality in May 1957, 1 \mathcal{Q} (deälated) (K. U. Coll.); "India Coimbatore Dist. Nilgiri Hill, Kollor Susai Nathan" 1 $\mathcal{J} \mathcal{I} \mathcal{Q}$ (apterous) (Mus. Nat. Hist. Basel, Switzerland).

Ptilomera (Ptilomera) timorensis n. sp.

Plate VIII

Size: Male (apterous): Length 15.1 mm.; width of head 2.31 mm.; width of pronotum 2.57 mm.; length of mesonotum 3.95 mm.; greatest width of body across mesoacetabula 4.00 mm. Female (apterous). Length 14.05 mm.; width of head 2.1 mm.; width of pronotum 2.57 mm.; length of mesonotum 3.95 mm.; greatest width of body across mesoacetabula 4.00 mm.

Color: Only head and pronotum with the typical ground color of reddish brown; Meso- and metonotum dark brown to black; first six abdominal tergites black, seventh may be reddish brown; genital segments paler; in all of the specimens the silvery pile bands and spots are confined to the sides. The venter with the usual short silvery pile. The typical pattern of black markings not distinguishable.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::153:35:42:31. Female: 1st:2nd:3rd:4th::120:28:35:27.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male (paratype)	7.77 mm.	6.81 mm.	3.71 mm	1.57 mm.
Female (paratype)	6.57 mm.	5.48 mm.	3.33 mm	1.38 mm.
Middle leg	Femur	Hind leg		Femur
Male (paratype)	22.14 mm.	Female (par	ratype).	
Male (paratype)	27.14 mm.	Female (par	atype).	

Male. Length of pregenital abdominal segments:Genital segments::86:84. Genital segments: Suranal plate with median lobe not broad but surpassing caudally the short broad lateral wings, the anterior and posterior margins of which are not parallel. Pygofer of unusual shape, quite uniformly broad, its apical margin broad with a median incission or notch, dorsolateral projections of pygofer short and slender. Shaft of paramere rather slender but almost entirely hidden by the median lobe of suranal plate. The arm is long. PLATE VIII



Ptilomera (Ptilomera) timorensis n. sp.

FIG. 1. Female allotype, dorsal view.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype, dorsal view.

FIG. 4. Male holotype, arm of left paramere.

FIG. 5. Female allotype, ventral view of sixth and seventh abdominal segments.

FIG. 6. Female allotype, side view of sixth and seventh abdominal segments.

Female. Length of thorax:Abdomen::110:128. Seventh abdominal tergite a little longer than the sixth. Connexival spines very short, inconspicuous, arising from end of connexivum and turned medially but too short for their tips to meet. Dorsolateral lobe short and broad at base without or with only the faintest indication of a ventrolateral lobe of seventh abdominal segment. Distal lobe of seventh abdominal sternite entirely exposed and not turned dorsally, its lateral margins nearly straight but converging, distal end slightly rounded as shown on Plate VIII fig. 5.

Comparative notes: This striking species is so different from any other that it can be recognized by anyone. The males by the broad pygofer with its distal margin at least slightly bi-lobed and the female by its very short connexival spines.

Types: This apterous type series consists of holotype male bearing the label, "Timor, Baaguia, August 1935. C. Bühler u. Meyer." Allotype with the label, "Timor Soe. June 1, 1935 C. Bühler u. Meyer." Paratypes from Timor Soe $2 \mathcal{J} \mathcal{J}$, and $1 \mathcal{J}$ labeled "Timor." Kirkaldy Coll. in K. U. Holotype allotype and $1 \mathcal{J}$ and 1φ paratypes are in Basel Museum, Switzerland and one pair in K. U. collection.

Distribution: Known only by the type localities.

Ptilomera (Ptilomera) chinai n. sp.

Plate IX

Size: Male (apterous): Length 17.14 mm.; width of head 2.38 mm.; width of pronotum 2.52 mm.; length of mesonotum 3.57 mm.; greatest width of body across mesoacetabula 3.90 mm. Female (apterous). Length 17.62 mm.; width of head 2.24 mm.; width of pronotum 2.29 mm.; length of mesonotum 3.52 mm.; greatest width of body across mesoacetabula 4.14 mm.

Color: Pattern typical for the genus. In these two specimens more of the ground color is exposed because the black areas are small. Vertex with two converging black stripes. The neck crossed by a black band; anterior margin of pronotum with a faint, dark band; two narrow longitudinal black lines on side of the mesoand metathorax separated by a broader band of ground color, which is not densely covered by silvery pile.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::164:38:53: ?.

Female: 1st:2nd:3rd:4th::145:32: ?: ?.

PLATE IX 2 3 5

Ptilomera (Ptilomera) chinai n. sp.

FIG. 1. Ventral view of genital segments of male holotype.

FIG. 2. Apterous male holotype.

FIG. 3. Apterous female allotype.

FIG. 4. Ventral view of sixth and seventh abdominal segments of female allotype.

FIG. 5. Female allotype, left side view of sixth and seventh abdominal seg-

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male (holotype)	8.67 mm.	7.33 mm.	4.48 mm.	
Female (allotype)	8.05 mm.	$7.10 \mathrm{mm}.$	$6.76 \mathrm{mm}.$	1.62 mm.
Middle leg	Femur	Hind leg		Femur
Male (holotype)	25.95 mm.	Male (holot	ype)	28.60 mm.
Female (allotype)	22.76 mm.	Female (all	otype)	26.19 mm.

Male (holotype). Length of pregenital abdominal segments: Genital segments::92:89. Genital segments: Median lobe of suranal plate moderately broad; lateral wings well developed, thickened toward their ends; their front and rear margins not parallel because the rear margin of basal half of the lateral wing of suranal plate concave, the wings surpass caudally the median lobe. Pygofer, as seen from below, with its lateral margins beyond the dorsolateral projections parallel or nearly so. Pygofer truncate (or slightly medially concave) at tip. Dorsolateral projections of pygofer as seen from above short, a little longer than the lateral wings of the suranal plate and rather pointed. Paramere long, the exposed shaft short, the long arm curved laterally, its blunt tip slightly turned caudally. The first genital segment with a distinct median longitudinal keel on its venter.

Female. Length of thorax:Abdomen::135:192. Seventh abdominal tergite only slightly shorter than sixth tergite. Moderately long connexival spines arise at end of connexivum. Dorsolateral lobe long, its base a long triangular lobe that becomes cylindrical, slightly sigmoid on upper margin and spine like. Ventrolateral lobe absent or very faintly indicated. Sides of the usually vertically directed distal lobe of the seventh abdominal sternite nearly straight and nearly parallel.

Comparative notes: Of the five species described from Borneo this is the only one in which the males have a pygofer with a broad nearly truncate tip and the females with a long dorsolateral lobe that is slightly sigmoid on upper margin, as seen laterally.

Types: Male holotype and female allotype both apterous, bear the label "Sambas Borneo (West Coast)." "C. J. Brooks, B. M. 1936-681." These are in the British Museum. Two paratypes, also apterous, are in the Bernice Bishop Museum in Hawaii. They bear the label "Borneo: Sarawak Kuching, Santubong 797 to 1500 m. June, 18-30, 1958. T. C. Maa, Collector No. M. B.-78" 1 \mathcal{J} , 1 \mathcal{Q} .

Distribution: Known only from the type localities.

This species is named in honor of Dr. W. E. China of the British Museum.

Ptilomera (Ptilomera) nunikanensis n. sp.

Plate X

Size: Male holotype (apterous): Length 14.52 mm.; width of head 2.19 mm.; width of pronotum 2.33 mm.; length of mesonotum 3.24 mm.; greatest width of body across mesoacetabula 3.43 mm.?

Female allotype (apterous): Length 15.48 mm.; width of head 2.05 mm.; width of pronotum 2.05 mm.; length of mesonotum 3.23 mm.; greatest width of body across mesoacetabula 3.57 mm.?

Color: Both specimens are teneral and the ground color nearly testaceous and black areas reduced. However, the pattern is typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::152:34:48:31.

Female: 1st:2nd:3rd:4th::145:30.5:?:?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male	8.10 mm.	6.57 mm.	3.95 mm.	1.57 mm.
Middle leg	Femur	0.29 mm. Hind leg	4.00 mm.	Femur
Male	21,52 mm,	Male		25.47 mm.
Female	20.00 mm.	Female		. 21.91 mm.

Male holotype. Length of pregenital abdominal segments::Genital segments::82:82. Genital segments: Suranal plate with median lobe small, lateral wings well developed and plainly surpassing median lobe caudally. Pygofer as seen from below conspicuously broad beyond the middle. Caudal half of that section of pygofer beyond its dorsolateral projections parallel sided. As seen laterally this distal portion is turned dorsally to a truncate tip as shown on plate X fig. 7. Dorsolateral projection of pygofer stout and extends laterally farther than the wing of suranal plate. The paramere stout, its shaft short, its arm long and of characteristic shape as shown on plate X fig. 4.

Female. Length of thorax:Abdomen::125:158. Seventh abdominal tergite about as long as sixth tergite. Connexival spine long, arising at end of connexivum. Dorsolateral and ventrolateral lobes separated by a narrow incision. Ventrolateral lobe sharp pointed.

Comparative notes: This species is quite distinct from other species of *Ptilomera* from Borneo.

Types: Holotype (apterous male) and allotype (apterous female) bear the labels "Nunikan 1. E. Kalimantan Dist. Indonesian Ptilomera (Ptilomera) nunikanensis n. sp.

FIG. 1. Male holotype, dorsal view.

FIG. 2. Female allotype, ventral view of sixth and seventh segments.

FIG. 3. Female allotype, dorsal view.

FIG. 4. Enlarged drawing of dorsal view of right paramere. (See fig. 1.)

 $F_{\text{IG.}}$ 5. Female allotype, left side view of sixth and seventh abdominal segments.

FIG. 6. Male holotype, ventral view of genital segments.

FIG. 7. Male holotype, right side view of genital segments.

PLATE X



Borneo," Forest stream XII 1953, Werner von Hentig leg." Both holotype and allotype are in the Chicago Mus. Nat. Hist.

Distribution: Known only from the type locality.

Ptilomera (Ptilomera) kirkaldyi n. sp.

Plate XI

We describe below two males from "Ost Borneo" as this species. The female came from "West Borneo" and may prove to be some other species. Therefore, we do not consider it as an allotype.

Size: Male holotype (apterous): Length 19.05 mm.; width of head 2.52 mm.; width of pronotum 2.90 mm.; length of mesonotum 4.33 mm.; greatest width of body across mesoacetabula 4.43 mm. Male paratype (macropterous). Length including wings 17.62 mm.; width of head 2.19 mm.; width across humeri 3.33 mm.; greatest width of body across mesoacetabula 3.88 mm.

Female from West Borneo (apterous): Length 17.14 mm.; width of head 2.19 mm.; width of pronotum 2.19 mm.; length of mesonotum 3.43 mm.; greatest width of body across mesoacetabula 4.10 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::190:43:?:?.

Female: 1st:2nd:3rd:4th::147:33:?:?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male (holotype)	10.00 mm.	8.67 mm.	5.24 mm.	2.00 mm.
Female (W. Borneo)	8.09 mm.	$6.76 \mathrm{mm}.$	4.19 mm.	
Middle leg	Femur	Hind leg		Femur
Male (holotype)	29.1 mm.	Male (holot	ype)	. 34.76 mm.
Female (W. Borneo)	22.05 mm.	Female (W.	Borneo).	25.71 mm.

Male holotype. Length of pregenital abdominal segments:Genital segments::98:87. Genital segments: Suranal plate with median lobe short, plainly surpassed caudally by the broad lateral lobes. Pygofer, as seen from below conspicuously broad beyond its middle, the sides converging to a dorsally directed point. In side view the pygofer has a slight transverse constriction. The paramere shaped as shown on Plate XI, fig. 7. Venter of first genital segment with a median longitudinal keel.

Female. This unattached female from West Borneo is unlike that of any other Borneo species so we tentatively place it here. Length of thorax:Abdomen::132:184. Seventh abdominal tergite PLATE XI



Ptilomera (Ptilomera) kirkaldyi n. sp.

FIG. 1. Male macropterous paratype from Borneo, Ost.

FIG. 2. Apterous female from Nowong, W. Borneo of P. kirkaldyi (?).

FIG. 3. Abdominal venter of apterous female from Nowong, W. Borneo of *P. kirkaldyi* (?).

FIG. 4. Holotype apterous male from Borneo, Ost.

FIG. 5. Apterous female from Nowong, W. Borneo. Side view of sixth and seventh abdominal segments of *P. kirkaldyi* (?).

FIG. 6. Venter of genital segments of male holotype.

FIG. 7. Exposed portion of shaft and arm of left paramere of holotype.

a little shorter than the sixth. Connexival spine long, arising from end of connexivum. Dorsolateral lobe of seventh abdominal segment long, spine like for its entire length as seen laterally. Ventrolateral lobe absent or but faintly indicated. Sides of the vertically directed distal lobe of the seventh abdominal sternite straight and nearly parallel.

Comparative notes: The closest relatives of this species are from other species from Borneo.

Types: Holotype apterous male and a paratype macropterous male are from East Borneo. They are in the K. U. Kirkaldy Collection. The female we tentatively assign to this species bears the label, "Mowong, W. Borneo F. Muir, Sept. 1907" and is in the California Academy of Sciences. It is not a type.

Distribution: Known only from above.

Ptilomera (Ptilomera) gressitti n. sp.

Plate XII

Size: Male holotype (apterous): Length 17.61 mm.; width of head 2.45 mm.; width of pronotum 2.24 mm.; length of mesonotum 3.66 mm.; greatest width of body across mesoacetabula 4.19 mm.

Female paratype (apterous). Length 17.38 mm.; width of head 2.21 mm.; width of pronotum 2.43 mm.; length of mesonotum 3.81 mm.; greatest width of body across mesoacetabula 4.38 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male holotype: 1st:2nd:3rd:4th::173:41: ?: ?.

Male paratype: 1st:2nd:3rd:4th::162:40:50:34.

Female paratype: 1st:2nd:3rd:4th::158:37:48:28+.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male holotype	9.52 mm. 6 24 mm	7.81 mm. 7.24 mm	4.86 mm.	2.00 mm. 1.76 mm
Middle leg	Femur	Hind leg	4.4) mm.	Femur
Male holotype	26.43 mm. 22.85 mm.	Male holoty Female para	pe	30.95 mm. 25.00 mm.

Male. Length of pregenital abdominal segments:Genital segments::87:72. Genital segments: Median lobe of suranal plate small; the short broad lateral wings only slightly surpassing median lobe, their rear margin not longer than the width of their tips. Pygofer as seen from below unusually broad beyond its lateral pro-

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PLATE XII

Ptilomera (Ptilomera) gressitti n. sp.

FIG. 1. Female, dorsal view.

FIG. 2. Male, ventral view of genital segments. Note the long parameres and the unusual width of pygofer at the caudal base of the lateral projections. FIG. 3. Male, dorsal view.

FIG. 4. Female, ventral view of sixth and seventh abdominal segments. Note the very large median caudal lobe of seventh ventrite.

FIG. 5. Female, side view of above. Note that the median caudal lobe is not turned dorsad as it is in most species.

jections which are slender, pointed and only slightly surpassing laterally the broad short lateral wings of suranal plate. Distal portion of pygofer with sides converging, its tip bluntly rounded. Paramere long, shaft and arm inseparable, as shown on Plate XII fig. 2.

Female. The length of thorax:Abdomen::142:172. Seventh abdominal tergite as long as the sixth. Connexival spine moderately long and arising from end of connexivum. In side view the species is unlike any other species. At first glance the dorsolateral lobe appears to have a notch on its lower margin and no ventrolateral lobe. However, the lower lobe beyond the notch is the ventrolateral lobe and therefore in the key it runs out to couplet 36. The distal lobe of seventh abdominal sternite is unusually large and not turned vertically.

Comparative notes: The female is unique, and its closest relative may be *P. nunikanensis*. The male, however, appears to be related to *P. kirkaldyi* and *P. nunikanensis*.

Types: Described from an apterous series containing $3 \overset{\circ}{} \overset{\circ}{}$, and $2 \overset{\circ}{} \overset{\circ}{}$ that bear the following labels: "British N. Borneo, West Coast Residency, Ranau 8 mi. N. Paring Hot Springs, 500m. Oct. 8-11, 1958" "T. C. Maa collector" Holotype, allotype and one male paratype are in the Bernice P. Bishop Museum, Honolulu, Hawaii, and one pair of paratypes are in the K. U. collection.

Distribution: Known only from the type locality.

Ptilomera (Ptilomera) hylactor Breddin

Plate XIII

- 1903. Ptilomera hylactor Breddin, Societas Entomologica 17(19):148. (Described from annam. ∂ and \mathcal{Q}).
- 1927. Ptilomera hylactor, Esaki, Eos, Rev. Esp. Ent. 3(3):259.
- 1933. Ptilomera hylactor, Hoffmann, Lingnan Sci. Jour. 12 Suppl. p. 247.
- 1933. Ptilomera hylactor, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 419.
- 1941. Ptilomera hylactor, Hoffmann, Lingnan Sci. Jour. 20(1):35.
- 1960. Ptilomera hylactor, Matsuda, Univ. Kansas Sci. Bull. 41(2):267, 539, fig. 621.

Of the ten species described by Breddin, he gave one or more figures for six of them. He gave no figure for *P. hylactor*. However, his description is adequate to recognize this striking species. He said it was the largest species known to him but it would have been more accurate to say it is the longest and most slender species.

For the redescription of this species we have before us three specimens from Breddin's collection that bear the label, "Annam Phuc-Son Nov.-Dez. H. Fruhstorfer," one male without genitalia, one female and one nymph. These now bear the red label "Typus" "det.

PLATE XIII



Ptilomera (Ptilomera) hylactor Breddin

FIG. 1. Female from type series, dorsal view.

FIG. 2. Ventral view of sixth and seventh abdominal segments of above female.

FIG. 3. Male from type series, ventral view of genital segments. Note the broad complete median keel on first genital segment and remarkable shape of the venter of the pygofer.

FIG. 4. Male from type series, dorsal view.

FIG. 5. Female, rear view of middle lobe of seventh abdominal ventrite.

FIG. 6. Female, sixth and seventh abdominal segments as seen from left side.

by Lundblad." We find in our Torre-Bueno Collection a pair with the same identical label as above and these enable us to give the following information:

Size: Breddin gave the length 18.5—19.5 mm. Hind femur and trochantur 32.5 mm. 226.5 mm.; while our Torre-Bueno pair are as follows:

Male (apterous): Length 18.1 mm.; width of head 2.17 mm.; width of prothorax 2.24 mm.; length of mesonotum 3.57 mm.; greatest width of body across mesoacetabula 3.64 mm.

Female (apterous): Length 18.57 mm.; width of head 2.12 mm.; width of pronotum 2.24 mm.; length of mesonotum 3.71 mm.; greatest width of body across mesoacetabula 4.00 mm.

Color: Quite typical for the genus. However, the four adults available to us have the abdominal tergites black.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::158:40:?:?.

Female: 1st:2nd:3rd:4th::162:33:?:?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male	$8.81 \mathrm{mm}.$	7.23 mm.	4.38 mm.	$1.85 \mathrm{mm}.$
Female	8.19 mm.	6.57 mm.	4.33 mm.	1.91 mm.
Middle leg	Femur	Hind leg		Femur
Male	24.52 mm.	Male		29.05 mm.
Female	21.9 mm.	Female		25.00 mm.

Male. Length of pregenital segments:Genital segments::102:85. Genital segments: Suranal plate with median lobe very short but moderately broad. Lateral wings of suranal plate short, moderately broad, their front and rear margins not parallel and not surpassing median lobe. Venter of pygofer with basal two thirds narrow, resembling a broad keel, sides above the keel concave to a position beyond the lateral projections of pygofer. As seen from below pygofer not conspicuously broad beyond its middle. Apex of pygofer bluntly rounded. Venter of first genital segment with a well developed keel. In dorsal view first genital is plainly longer than seventh tergite or than suranal plate.

Female. Length of thorax:Abdomen::142:207. Seventh abdominal tergite as long as sixth. Connexival spine moderately long, arising from the end of the connexivum. Incission between dorsolateral and ventrolateral lobes broad and shallow. Both lobes long and spine-like. Dorsolateral lobe of seventh abdominal segment long, stout and straight, its upper margin from base of connexival spine to its tip nearly twice as long as connexival margin of seventh abdominal segment. Distal lobe of the seventh sternite rather long and narrow, turned dorsally and embraced by lateral lobes.

Comparative notes: This species stands quite alone, but runs out to couplet 13 in the key to males, and to couplet 47 in key to females.

Types: An apterous male without the genital segments, and an apterous female and one nymph, all bearing the label "Annam Phuc-Son Nov. Dez. H. Fruhstorfer." All types are in Deutsches Entomologisches Institut, Berlin.

Distribution: Known only from the type series, a pair of which we found undetermined in our Kirkaldy Collection at K. U., and $1 \overset{?}{\underset{l}{\mathcal{J}}}$ bearing the label "Haut Mekong Pau Lan 13 V. 1918. R. V. de Salvaza" (Brit. Mus.).

Ptilomera (Ptilomera) breddini n. sp.

Plate XIV

Size: Male paratype (apterous): Length 15.62 mm.; width of head 2.1 mm.; width of pronotum 2.36 mm.; length of mesonotum 3.14 mm.; greatest width of body across mesoacetabula 3.48 mm.

Female paratype (apterous): Length 15.00 mm.; width of head 2.1 mm.; width of pronotum 2.14 mm.; length of mesonotum 2.90 mm.; greatest width of body across mesoacetabula 3.86 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::142:38:?:?.

Female: 1st:2nd:3rd:4th::128:28:?:?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male	$7.61 { m mm}$.	$6.67 \mathrm{mm}.$	3.71 mm.	1.43 mm.
Female	$6.67 \mathrm{mm}.$	5.81 mm.	$3.81 \mathrm{mm}$.	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Male	$20.48 \mathrm{mm}$.	Male		22.62 mm.
Female	18.57 mm.	Female		19.52 mm.

Male. Length of pregenital abdominal segments:Genital segments::91:81. Genital segments: Suranal plate with median lobe broader than the lateral wings which are long, surpassing caudally the median lobe and have their front and rear margins nearly parallel. Pygofer with its dorsolateral projections short and rather slender. Pygofer as seen from below not conspicuously broad beyond its middle and appearing rather elongate, its venter appear-

Ptilomera (Ptilomera) breddini n. sp.

FIG. 1. Female allotype, dorsal view.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype, dorsal view.

FIG. 4. Male holotype, side view of left paramere.

FIG. 5. Male holotype, rear view of arm of left paramere.

 F_{IG} . 6. Female allotype, ventral view of sixth and seventh abdominal segments.

 $F_{\rm IG}.$ 7. Female allotype, left side view of sixth and seventh abdominal segments.

PLATE XIV



ing slender, its tip pointed. Paramere with its shaft longer than its arm. The arm as seen from the rear, with a ventral bulge or keel as shown of Plate XIV figs. 4, 5.

Female. Length of thorax:Abdomen::116:160. Seventh abdominal tergite about as long as sixth. Connexival spine moderately long and arising from end o^f seventh connexivum. Seventh abdominal segment with dorsolateral and ventrolateral lobes separarated by a deep incission; dorsolateral lobe rather slender, only moderately long, its upper margin from base of connexival spine to its tip much less than twice as long as connexival margin of seventh abdominal segment. Distal lobe of seventh abdominal sternite of usual size and embraced by the lateral lobes, its sides straight and nearly parallel and directed vertically.

Comparative notes: Nearest relative is *P. papuensis* n. sp. which runs out with it to couplet 16 of the key to males and to couplet 49 in the key to females.

Types: Male holotype, allotype and 2 males and 1 female paratypes bearing the label "N. Guinea S. E. Haveri, Loria VII, XI-93." and one male "Milne Bay, N. Guinea" one female "N. Guinea, S. E. Paunemu riv. Loria IX-XII 92". Types are in the Kirkaldy Collection at K. U.

Distribution: Known only by the type localities.

Ptilomera (Ptilomera) papuensis n. sp.

Plate XV

Size: Male paratype (apterous): Length 15.00 mm.; width of head 2.02 mm.; width of pronotum 2.42 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesoacetabula 3.67 mm. Female paratype (apterous). Length 14.52 mm.; width of head 1.95 mm.; width of pronotum 2.24 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesoacetabula 3.81 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::138:35:49:31.

Female: 1st:2nd:3rd:4th::125:29:40:28.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male paratype	7.61 mm.	6.67 mm.	3.71 mm.	$1.43 \mathrm{mm}$.
Female paratype	$6.67 \mathrm{mm}.$	5.81 mm.	3.81 mm.	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Male paratype	20.48 mm.	Male paraty	pe	22.62 mm.
Female paratype	18.57 mm.	Female para	type	19.52 mm.

Male. Length of pregenital abdominal segments:Genital segments::80:118. Genital segments: Suranal plate with median lobe not large, not wider than width of lateral wings which are long, surpassing caudally the median lobe and have their front and rear margins nearly parallel. Pygofer with its dorsolateral projections short and rather slender. Pygofer as seen from below not conspicuously broad beyond its middle and rather elongate, its venter appearing slender, its tip pointed. Paramere with shaft longer than its arm. See Plate XV fig. 4.

Female. Length of thorax:Abdomen::135:163. Seventh tergite slightly shorter than sixth. Connexival spine moderately long and arising from end of seventh connexivum. Seventh abdominal segment with dorsolateral and ventrolateral lobes separated by a deep incission; dorsolateral lobe stout, only moderately long, more or less spine-like, its upper margin from base of connexival spine to its tip much less than twice as long as connexival margin of seventh abdominal segment. Distal lobe of seventh abdominal sternite of usual size.

Comparative notes: Its nearest relative is *P. breddini* n. sp., which runs out with it to couplet 16 of the key to males and to couplet 49 in the key to females.

Types: Male holotype, allotype and 5 males and 5 female paratypes, all apterous, bear the label "Mt. Lamington N. E. Papua 1300-1500 ft. C. T. McNamara." One pair of paratypes are in the K. U. collection. All others are in S. Australian Museum.

Distribution: Besides the above types there are three males and one female which bear the label "Finsch Haven, New Guinea L. Wagner." These are very pale specimens and appear teneral. The males appear to be this species but the female has the ventrolateral lobe of the seventh segment broadly truncate at tip but may represent the same kind of variation that appears to occur in *P. harpyia* Schmidt.

Ptilomera (Ptilomera) papuensis n. sp.

FIG. 1. Female from N. E. Papua, dorsal view.

FIG. 2. Male from above place, ventral view of genital segments.

FIG. 3. Male from above place, dorsal view. Note the long parallel sided lateral wings of suranal plate.

FIG. 4. Male. Left paramere as seen from the side.

FIG. 5. Same female as in figure 1, ventral view of sixth and seventh abdominal segments.

FIG. 6. Female, side view of sixth and seventh abdominal segments.

Ptilomera (Ptilomera) aëllo aëllo Breddin

Plate XVI, figs. 3, 8 and 9

- 1906. *Ptilomera aëllo* Breddin, Societas Entomologica, 21(2):9. (Described from 3 apterous ♀♀, 1 nymph from "Timmena, Nieuw Guinea Expeditie 1903").
- 1958. Ptilomera aëllo Hungerford and Matsuda, Bull. Brooklyn Ent. Soc. 53(3):69.
- 1960. Ptilomera aëllo Matsuda, Univ. Kansas Sci. Bull. 41(2):267, 539.

This species from New Guinea has been overlooked by other writers for fifty years. It was published in an obscure journal which claimed to be the "Organ of the International Entomological Society" and we found it in R. 9 of the bound volumes of Kirkaldy's library of separates in the University of Kansas. In his description Breddin wrote that this species is broader and shorter than the other species known to him, the abdomen shorter in relation to the thorax. His color description is not specific. He gave no illustration but said that the contour of the side plate of the seventh addominal segment was nearest to that of *P. pamphagus* Breddin. We therefore give the following redescription and figures of his types:

Size: Breddin gave the length as 14.00 mm. including the connexival spines 14.5 mm. We here give the measurements of the largest of the three apterous female cotypes. Length 14.00 mm.; width of head 2.05 mm.; width of pronotum 2.19 mm.; length of mesonotum 3.09 mm.; greatest width of body across the mesoacetabula 4.33 mm.

Color: Typical for the genus. The ground color and black markings subject to the same variations that occur in most other species. For example, one cotype has four distinct black dots on the vertex, as described by Breddin, a second has front and rear dots on each side connected by an embrowned line, and the third cotype has the embrowned connecting line nearly black so that the vertex has two converging lines on the vertex instead of four dots.

Structural characteristics: Relative lengths of antennal segments. 1st:2nd:3rd:4th::125:33:46:31.

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Female type	6.9 mm.	$5.9 \mathrm{mm}$	3.81 mm.	1.38 mm.
Middle leg	Femur	Hind leg		Femur
Female type	19.14 mm.	Female type	• • • • • • • • • • •	21.19 mm.

Actual Lengths of Leg Segments

Female. Length of the thorax:Abdomen::114:132 in one cotype and ::120:135 in another. Thus this is not a character that would

separate this species from others as Breddin thought. Since the male of this species is unknown, we can only give the characters of the seventh abdominal segment of the female. Seventh tergite a little shorter than sixth. Connexival spines long, arising from the curved edge of the connexivum. Dorsolateral and ventrolateral lobes short, separated by a moderately narrow and deep incission; dorsal margin from base of connexival spine to its tip nearly straight or slightly concave and shorter than the connexival spine.

Comparative notes: This is one of species in which the incission between dorsolateral and ventrolateral lobes is relatively small in the female. Yet this species can be recognized from the couplet 46 in the key to female.

Types: Three females from "Nieuw Guinea Expeditie Timmema 6-7 apr." In Deutsches Entomologisches Institut in Berlin.

Distribution: Known only from the type locality.

Ptilomera (Ptilomera) aëllo cheesmanae n. subsp.

Plate XVI, figs. 1, 2, 4, 5, 6, 7, 10

We have three species from New Guinea, none of which possesses females like the type of *P. aëllo* Breddin, but one is certainly close. Therefore we are placing it as a subspecies.

Size: Male holotype (apterous): Length 16.67 mm.; width across head 2.48 mm.; width of pronotum 7.71 mm.; length of mesonotum 8.81 mm.; greatest width of body across mesoacetabula 4.43 mm.

Female allotype (apterous): Length 15.24 mm.; width across head 2.24 mm.; width of pronotum 2.38 mm.; length of mesonotum 3.14 mm.; greatest width of body across mesoacetabula 4.57 mm.

Color: Typical for the genus. In most of the specimens the vertex has a black line along the inner margin of the eye that joins the front end of each of the two converging lines.

Structural characteristics: Relative lengths of antennal segment. Male: 1st:2nd:3rd:4th::167:44:54:36.

Female: 1st:2nd:3rd:4th::135:35:47:31.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male	8.95 mm.	6.76 mm.	5.14 mm,	1.71 mm.
Female	7.15 mm.	6.29 mm.	$3.00 \mathrm{mm}.$	1.48 mm.
Middle leg	Femur	Hind leg		Femur
Male	25.90 mm.	Male		30.71 mm.
Female	20.48 mm.	Female		22.48 mm.

PLATE XVI

Ptilomera (Ptilomera) aëllo aëllo Breddin

FIG. 3. Female cotype, dorsal view.

FIG. 8. Female cotype, ventral view of sixth and seventh abdominal segments.

FIG. 9. Female cotype, lateral view of sixth and seventh abdominal segments.

Ptilomera (Ptilomera) aëllo cheesmanae n. subsp.

FIG. 1. Female, dorsal view.

- FIG. 2. Female, ventral view of sixth and seventh abdominal segments.
- FIG. 4. Male, dorsal view.
- FIG. 5. Male, ventral view of genital segments.
- FIG. 6. Male, left paramere.
- FIG. 7. Male, dorsal view of second genital segment.

FIG. 10. Female, lateral view of sixth and seventh abdominal segments.

PLATE XVI°



Male. Length of pregenital abdominal segments: Genital segments::85:62. Genital segments: Suranal plate with median lobe not large. Lateral wings of suranal plate with front and rear margins nearly parallel, not surpassing median lobe caudally. Lateral wings rather long, rear margins nearly twice as long as their width at their tips. Pygofer with short dorsolateral projections; Apex of pygofer pointed; Pygofer as seen from below not conspicuously broad beyond its middle; paramere as shown on Plate XVI figs. 6, 7.

Female. Length of thorax:Abdomen::130:152. Seventh tergite considerably shorter than sixth. Connexival spines not as long as in the true *P. aëllo*. The connexival ridge convexly curved laterally before forming the base of connexival spine. Dorsolateral and ventrolateral lobes short, separated by a moderately narrow incission; dorsolateral lobe turned obliquely down, its dorsal margin from base of connexival spine to its tip convexly curved and longer than connexival spine.

Comparative notes: The key will separate the female from that of the typical *P. aello*, and the male in couplet 17 from *P. oribasus* Breddin.

Types: Described from apterous male holotype, apterous female allotype and two male and two female paratypes from "Dutch New Guinea, Cyclops Mts. Mt. Lina 3500 ft. III 1936 L. E. Cheesman" and 3 male and 2 female paratypes from "Dutch New Guinea Cyclops Mts. Sabron. 930 ft. IV 1936 L. E. Cheesman. All are apterous. The type series is in the British Museum. 1 male and 1 female are in K. U. collection.

Distribution: Known only for the type localities.

Ptilomera (Ptilomera) tigrina Uhler

Plate XVII, figs. 1, 2, 4

- 1860. *Ptilomera tigrina* Uhler, Pro. Acad. Nat. Sci. Philadelphia June 1860: 230. (Described from Hong Kong).
- 1866. *Ptilomera tigrina*, Mayr, Novara-Exped. Zool. Theil. Bd. II Abth. 1:177. (Gave this as synonym of *P. laticaudata* (Hardw.) in error).
- 1904. Ptilomera tigrina, Distant, Faun. Brit. Ind. Rhynch. II:185. (Gave this as synonym of P. laticaudata (Hardw.) in error).
- 1927. Ptilomera tigrina, Esaki, Eos, Rev. Esp. Ent. 3(3):259. (Listed).
- 1933. Ptilomera tigrina, Wu, Lingnan Sci. Jour. 12 Suppl:209. (Listed).
- 1933. Ptilomera tigrina, Hoffmann, Lingnan Sci. Jour. 12 Suppl.: 247. (Listed).
- 1933. *Ptilomera tigrina*, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 418. (He did not see this species).
- 1935. Ptilomera tigrina, Wu, Ins. Sinen. 2:543. (Catalogue).
- 1941. Ptilomera tigrina, Hoffmann, Lingnan Sci. Jour. 20(1):35. (Catalogue).

For more than one hundred years this species has remained unrecognized although three female types have been in the U. S. National Museum in Washington D. C. during all this time.

Redescription of these female types:

Size: Female paratype (apterous). Length 16.43 mm.; width of head 2.05 mm.; width of pronotum 2.12 mm.; length of mesonotum 3.29 mm.; greatest width of body across mesoacetabula 3.71 mm.

Color: Color and pattern typical for the genus. These types have the abdominal tergites mostly of the ground color with the black markings confined to the anterior and lateral margins of each tergite.

Structural characteristics: Antennae are missing.

Actual Lengths of Leg Segments

Front leg Female (paratype)	Femur 7.00 mm.	Tibia 6.05 mm.	1st tarsal segment 3.67 mm.	2nd tarsal segment 1.48 mm.
Middle leg	Femur	Hind leg	ratype)	Femur
Female (paratype)	20.14 mm.	Female (pa		22.14 mm.

Males are unknown but we suspect that when they are found *P*. *harpyia* Schmidt will be a synonym of this species.

Female. Length of thorax:Abdomen::132:172. Seventh abdominal tergite shorter than sixth tergite (82.35:100). Connexival spine of moderate length, arising far beyond the seventh tergite, of moderate length but not reaching the tip of the dorsolateral lobe. Ventrolateral lobe broad and truncate at tip. Distal lobe of seventh abdominal sternite hidden by the broad ventrolateral lobes and directed dorsad. Dorsolateral lobe of seventh abdominal segment moderately long and spine-like, its upper margin from base of connexival spine to its tip much less than twice as long as connexival margin of seventh abdominal segment. Incission between the dorsolateral and ventrolateral lobes of seventh abdominal segment not as deep as broad. In side view ventrolateral lobe of seventh abdominal segment longer than the venter of seventh abdominal segment before it.

Types: Three females from Hong Kong, China are in the U. S. National Museum.

Comparative notes: Every close to, if not identical with, *P. harpyia* Schmidt from Cambodia which may prove to be a synonym.

Distribution: Known only from the type locality. If P. harpyia proves to be a synonym of this species, it will extend its distribution far to the south and westward.

Ptilomera (Ptilomera) tigrina Uhler

Fig. 1. Female cotype, dorsal view.

FIG. 2. Female cotype, ventral view of sixth and seventh abdominal segments. Note the truncate tip of ventrolateral lobe and that the base of this lobe is broad, its basal margin turned medially, its inner margin nearly meeting opposite lobe.

FIG. 3. Male of P. harpyia Schmidt from Loas, Tonkin.

FIG. 4. Female cotype, ventral view of sixth and seventh abdominal segments.

FIG. 5. Male of *P. harpyia* Schmidt from Laos, Tonkin. Arm of left paramere seen from rear view.

FIG. 6. Male of *P. harpyia* Schmidt from Laos, Tonkin. Dorsal view of second genital segment.

FIG. 7. Male of above, ventral view of genital segments.

PLATE XVII



Ptilomera (Ptilomera) harpyia Schmidt

Plate XVII, figs. 3, 5, 6, 7, and Plate XVIII

- 1926. *Ptilomera harpyia* Schmidt, Ent. Mitt. 15(1):65. (Described female from "Cambodja").
- 1927. Ptilomera harpyia, Esaki, Eos, Rev. Esp. Ent. 3(3):259-260.
- 1933. Ptilomera harpyia, Hoffmann, Lingnan Sci. Jour. 12 Suppl. 247.
- 1933. Ptilomera harpyia, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 373, 419-421.
- 1941. Ptilomera harpyia, Hoffmann, Lingnan Sci. Jour. 20:34.
- 1960. Ptilomera harpyia, Matsuda, Univ. Kansas Sci. Bull. 41(2):267.

As in other Schmidt types the seventh abdominal segment is mounted on a slide. If this had not been done the type could have been described and illustrated more satisfactorily. We have no specimens from Cambodia. Fortunately we have found in our Torre-Bueno Collection, "Laos, Tonkin." The females are very near the cotypes of *P. trigrina* Uhler from Hong Kong, China, and the type of *P. harpyia* Schmidt from Cambodia. However, these females from Tonkin are more like the *P. harpyia* Schmidt type, and we are therefore labeling them *P. harpyia* Schmidt. Whether the latter is a synonym of *P. tigrina* or not cannot be determined until we see males that are taken with females of *P. tigrina*.

Size: Schmidt gave the body length of the apterous female type "14.00 mm." "; greatest width 4.00 mm.; length of hind femur 22.00 mm." We add the following: Width of head 2.05 mm.; width of pronotum 2.10 mm.; length of mesonotum 3.43 mm.; greatest width of body across mesoacetabula 3.67 mm. Measurements of an apterous pair from "Laos, Tonkin":

Male. Length 17.14 mm.; width of head 2.24 mm.; width of pronotum 2.33 mm.; length of mesonotum 3.71 mm.; greatest width of body across mesoacetabula 3.81 mm. This we have labeled "Neallotype."

Female. Length 17.71 mm.; width of head 2.10 mm.; width of pronotum 2.14 mm.; length of mesonotum 3.62 mm.; greatest width of body across mesoacetabula 3.86 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Female type: 1st:2nd:3rd:4th::140:32:41:28.

Male from Laos: 1st:2nd:3rd:4th::162:40: ?: ?.

Female from Laos: 1st:2nd:3rd:4th::142:32:42:27.

 $^{^{\}circ}$ By adding length of the body of the type and slide mount we get 16.66 mm. instead of 14.00 mm.

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
emale type	6.95 mm.	6.05 mm.	3.81 mm.	1.52 mm.
lale from Laos	8.33 mm.	$7.28 \mathrm{mm}$.		
emale from Laos	7.86 mm.	6.29 mm.	$4.10 \mathrm{mm}.$	1.57 mm.
Middle leg	Femur	Hind leg		Femur
emale type	21.52 mm.	Female type		22.00 mm.
lale from Laos	24.05 mm.	Male from Laos		$27.95 \mathrm{mm}.$
emale from Laos	$20.48 \mathrm{mm}$.	Female from	m Laos	23.67 mm.

Actual Lengths of Leg Segments

F M F

F M F

Female. Relative length of the thorax is to that of the abdomen cannot be determined for the female holotype but for a female from Laos it is 137:172. Connexival spine about as long as seventh abdominal tergite and arises at end of seventh connexivum. Both dorsolateral and ventrolateral lobes present. Dorsolateral lobe rather long, more or less spine-like, its upper margin from base of connexival spine to its tip much less than twice as long as connexival margin of seventh abdominal segment. Incission between the dorsolateral and ventrolateral lobes not as deep as broad; dorsolateral lobe broad at base; ventrolateral lobe truncate at tip in types of both *P. tigrina* Uhler and *P. harpyia* Schmidt. However, the latter species varies as shown on Plate XVIII figs. 7, 8, 9.

Male neallotype. Length of pregenital abdominal segments: Genital segments::102:73. Genital segments: Suranal plate with median lobe small, not surpassing lateral wings which are moderately short, their front and rear margins not parallel. Pygofer as seen from below with distal half slender and pointed. Dorsolateral projection of pygofer as seen in dorsal view short and slender. Paramere with shaft longer than arm which turns obliquely laterad as seen from above. In rear view the arm is curved obliquely dorsad, its sides not parallel.

Comparatives notes: This species cannot be placed as a synonym of *P. tigrina* Uhler until the male of the latter is found.

Type: The apterous female type bears the labels "Cambodja" and Schmidt's determination label. They are in the Polish Academy of Sciences, Warsaw, Poland. The apterous male neallotype bears the label "Laos, Tonkin." Four other males and two females that have been compared with the types of *P. tigrina* Uhler and *P. harpyia* Schmidt appear to be the same as the latter.

Distribution: In addition to the types we have seen the following: Laos: "Laos-Tonkin Staudinger and Bank-Haas. 1 female that is like the above. (California Acad. Sci.) "Laos Ban Na Mon. Dec. 12, 1919. R. V. de Salvaza" 1 Q (British Mus.) Ptilomera (Ptilomera) harpyia Schmidt

FIG. 1. Female from Laos, Tonkin, compared with type. Dorsal view.

FIG. 2. Side view of sixth and seventh abdominal segments of above female.

FIG. 3. Ventral view of sixth and seventh abdominal segments of above female.

FIG. 4. Ventral view of seventh abdominal segment of type drawn from slide mount.

FIG. 5. Female from Chiengriai, Thailand. Side view of seventh abdominal segment. We have a female like this from Laos.

FIG. 6. Female type. Seventh segment of type in dorsal view, drawn from the slide mount.

FIG. 7. Female from Trang, Thailand. Side view of seventh abdominal segment.

FIG. 8. Another female from above place.

FIG. 9. Still another female from Trang, Thailand. Note that only Fig 8 has a truncate end of the ventrolateral lobe as in *P. harpyia* type. Males do not show such variation.
PLATE XVIII



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Thailand: "Trang, Thailand, Namtok Ching. Apr. 18, 1952. Mt. str. M. E. Griffith $2 \not \exists \exists 3 \not \varphi \varphi$. While the males are undoubtedly *P. harpyia* (see Plate XVII fig. 3), the females vary, only fig. 8 on plate XVIII is near the typical form. (K. U. Col.). "Chiengmai, Thailand. Doi Sutep. Mt. Stream Mra. 26, 1952, M. E. Griffith" $2 \not \varphi \varphi$, 3 nymphs. (K. U. Col.) "Thailand 957d. Chiengmai Prov. Puang Rapila D. C. Thurman" $2 \not \varphi \varphi$. (K. U. Col.)

Burma: "Myitkyina, Burma Nov. 30, 1945, B. McDermett" 1 ♀, 2 nymphs. (K. U. Col.); "Tingkawk, Burma, May 25, 1944, L. C. Kuitert" 2 ♂ ♂, 2 ♀ ♀. Malaya: "Gunong Pulai Johore Feb. 10, 1961, C. H. Fernando"

Malaya: "Gunong Pulai Johore Feb. 10, 1961, C. H. Fernando" 1 \mathcal{J} , 1 \mathcal{Q} ; same place "Feb. 21, 1961." 2 \mathcal{J} \mathcal{J} (K. U. Col.); "Gunong Pulai, Stream June 1960, C. H. Fernando." 2 \mathcal{Q} \mathcal{Q} (K. U. Col.); "Malay Panin. Selangor" 2 apterous and 1 macropterous \mathcal{J} \mathcal{J} . (British Museum).

Philippines: "C. N. H. Mus. Philippine Zool. Exp. 1946-47. F. G. Werner. leg" $1 \mathcal{J}$. (Chicago N. H. Mus.).

Ptilomera harpyia ceramensis n. subsp.

Plate XIX

Size: Male holotype (apterous). Length 14.28 mm.; width of head 2.00 mm.; width of pronotum 2.14 mm.; length of mesonotum 2.90 mm.; greatest width of body across mesoacetabula 3.00 mm.

Female allotype (apterous): Length 13.90 mm.; width of head 1.95 mm.; width of pronotum 2.00 mm.; length of mesonotum 2.86 mm.; greatest width of body across mesoacetabula 3.38 mm.

Color: These two specimens have more of the ground color and smaller black areas than is usual and these are not strikingly black but dark brown, and more or less covered by silvery pubescense. The pattern must still be called typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::120:30:38:25.

Female: 1st:2nd:3rd:4th::112:26:35:25.

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male	6.57 mm.	$5.57 \mathrm{mm}$.	$3.24 \mathrm{mm}$.	1.33 mm.
Female	6.19 mm.	$5.38 \mathrm{~mm}$.	$3.43 \mathrm{mm}$.	1.38 mm.
Middle leg	Femur	Hind leg		Femur
Male	18.57 mm.	Male		21.90 mm.
Female	17.14 mm.	Female		18.48 mm.

Actual Lengths of Leg Segments

Male holotype: Length of pregenital abdominal segments: Genital segments:: 79:78. Genital segments: Suranal plate with median lobe small not surpassing lateral wings which are moderately long and narrow, their front and rear margins not parallel. Pygofer as seen from below long and slender, its tip pointed. Dorsolateral projection slender, barely surpassing the lateral wing of the suranal plate. Shaft of paramere relatively longer and more slender than in *P. harpyia harpyia* and the arm relatively shorter with its tip turned out instead of inward as viewed from the rear, and its sides not parallel.

Female: Length of thorax:Abdomen::115:143. Connexival spine about as long as tergite of seventh abdominal segment and arises from the end of the connexivum. Both dorsolateral and ventrolateral lobes present. Dorsolateral lobe rather long, its upper margin from base of connexival spine to its tip much less than twice as long as the connexival margin of seventh abdominal segment. Incission between the dorsolateral and ventrolateral lobes not as deep as broad. Ventrolateral lobe not as broad as in typical P. *harpyia* Schmidt. See Plate XIX fig. 6.

Comparative notes: When a longer series of this form are taken from Ceram it may prove to be a distinct species.

Types: Holotype male and allotype bear the label "Piroe, Ceram. F. Muir Feb. 1909," in California Acad. Sci. Mus.

Distribution: Known only from the types which came from the Island of Ceram.

Ptilomera (Ptilomera) harpyia ceramensis n. subsp.

FIG. 1. Female allotype, dorsal view.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype, dorsal view.

FIG. 4. Female allotype, ventral view of sixth and seventh abdominal segments.

FIG. 5. Male holotype, rear view of arm of left paramere.

FIG. 6. Female paratype, side view of sixth and seventh abdominal segments.

PLATE XIX







Ptilomera sumbaensis n. sp.

Plate XX

Size: Male (apterous): Length 16.67 mm.; width of head 2.57 mm.; width of pronotum 2.71 mm.; length of mesonotum 3.1 mm.; greatest width of body across mesoacetabula 4.52 mm. Female (apterous). Length 14.1 mm.; width of head 2.24 mm.; width of pronotum 2.24 mm.; length of mesonotum 2.95 mm.; greatest width of body across mesoacetabula 4.43 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::158:40:48:36.

Female: 1st:2nd:3rd:4th::127:32:38:28.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male paratype	8.81 mm.	$7.23 \mathrm{mm}.$	4.19 mm.	1.81 mm.
Female paratype	$6.86 \mathrm{mm}.$	5.76 mm.	$3.48 \mathrm{~mm}$.	1.57 mm.
Middle leg	Femur	Hind leg		Femur
Male paratype	23.57 mm.	Male paraty	ре	28.19 mm.
Female paratype	18.29 mm.	Female para	type	19.81 mm.

Male. Length of pregenital abdominal segments: Genital segments::80:107. Hind coxae reaching rear margin of fifth tergite. Genital segments: Suranal plate with median lobe small, lateral wings plainly surpassing median lobe, front and rear margins of lateral wing nearly parallel. Pygofer, as seen from below rather elongate, its dorsolateral projections short, not extending laterally beyond the lateral wings of suranal plate. Caudal end of pygofer with sides converging and tip roundly pointed and obliquely turned dorsad as seen from the side. Dorsolateral projections of pygofer before its middle. Shaft of paramere longer than arm which is turned more or less downward.

Female. Length of thorax:Abdomen::115:140. Seventh abdominal tergite nearly as long as the sixth. Connexival spines moderately long, arising from the end of the connexivum. Dorsolateral lobe of seventh segment with its upper margin from base of connexival spine to its tip broadly curved. The dorsolateral lobe broad at base and turned ventrad. The incission between dorsolateral and ventrolateral lobes deep and narrow.

Comparative notes: This species is a near relative of *P. pamphagus* and in the key runs out near it for both male and female. The males have the hind coxae reaching to or beyond the rear margin

PLATE XX



Ptilomera (Ptilomera) sumbaensis n. sp.

- FIG. 1. Female, dorsal view.
- FIG. 2. Male, ventral view of genital segments.
- FIG. 3. Male, dorsal view.
- FIG. 4. Side view of left paramere.
- FIG. 5. Rear view of left paramere arm.
- FIG. 6. Female, ventral view of sixth and seventh abdominal segments.
- FIC. 7. Female, side view of sixth and seventh abdominal segments.

of the fifth abdominal tergite which is a distinctive feature. The females of both species have the short dorsolateral lobe directed ventrad and are separated in couplet 42 in the key.

Types: Male holotype (apterous), apterous allotype and $4 \not\subset \beta$, $4 \not\in \varphi$, apterous paratypes, all bearing the label "Langgai, O. Sumba July 13, 1949. Dr. Bühler and Dr. Sutter." Holotype, allotype and $3 \not\subset \beta$ and $3 \not\in \varphi$ paratypes are in the Natural History Museum, Basel, Switzerland. One pair of paratypes are in the K. U. collection.

Distribution: Known only from the type locality.

Ptilomera maai n. sp.

Plate XXI

Size: Male holotype (apterous): Length 15.85 mm.; width of head 2.24 mm.; width of pronotum 2.33 mm.; length of mesonotum 3.33 mm.; greatest width of body across mesoacetabula 3.71 mm.

Female (deälated macropaterous): Length 14.05 mm.; width of head 2.1 mm.; width across humeri 3.05 mm.; greatest width of body across mesoacetabula 3.57 mm.

Color: Typical for the genus but these two specimens show more of the ground color than is usual.

Structural characteristics: Relative lengths of the antennal segments.

Male: 1st:2nd:3rd:4th::150:38:?: ?. Female: 1st:2nd:3rd:4th::125:29:41:31.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	Ist tarsal segment	2nd tarsal segment
Male holotype	8.57 mm.	7.29 mm.	4.52 mm.	1.81 mm.
Female allotype	$6.66 \mathrm{mm}$.	$5.62 \mathrm{~mm}.$	3.24 mm.	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Male holotype	24.29 mm.	Male holoty	ре	28.81 mm.
Female allotype	18.33 mm.	Female allot	ype	20.48 mm.

Male. Length of pregenital abdominal segments:Genital segments::88:78. Genital segments: Suranal plate with median lobe small, surpassed caudally by the lateral wings, the front and rear margins of which are not parallel. Pygofer as seen from below appearing narrow, dorsolateral projections slender, extending a little laterad of wings of suranal plate. Tip of pygofer nearly pointed. Paramere with exposed shaft shorter than its arm. Hind coxae only reaching rear margin of fourth abdominal tergite. PLATE XXI



Ptilomera (Ptilomera) maai n. sp.

Fig. 1. Female allotype (deälated macropterous form). Compare with Fig. 3.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype (apterous), dorsal view.

FIG. 4. Left paramere.

FIG. 5. Female allotype, ventral view of sixth and seventh abdominal segments.

FIG. 6. Female allotype, side view of sixth and seventh abdominal segments.

Female. The length of thorax:Abdomen::115:135. Seventh abdominal tergite a little shorter than the sixth. Connexival spines of median length arising from end of connexivum. Dorsolateral lobe moderately long, ventrolateral lobe but faintly indicated. Distal lobe of seventh abdominal sternite of usual size and turned vertically, two short parallel ridges near its base.

Comparative notes: In the key to males this species runs out to couplet 21 with *P. sumbaensis* n. sp. and in our key to females to couplet 50 with *P. nunikaensis* n. sp. which also occurs in Borneo.

Types: The holotype and allotype which are apterous, carry the label "Borneo: Sarawak. Kampong Pueh, Lundu District 690-1500 m. May 25-31, 1958 T. C. Maa." These are in Bernice P. Bishop Museum, Honolulu, Hawaii.

Distribution: Known only by the above type locality.

Ptilomera (Ptilomera) pamphagus Breddin

Plate XXII

- 1901. Ptilomera pamphagus Breddin, Abh. Naturf. Ges. Halle, Bd. 24(20):86-87. Taf. 1 fig. 10. (Described ♀, ♂ from Celebes).
- 1927. Pitlomera pamphagus, Esaki, Eos, Rev. Esp. Ent. 3(3):261.
- 1933. Ptilomera pamphagus, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372-373, 518, 420-421, 426-429, figs. 136, 137. (Gave as synonyms: P. oribasus Breddin, P. laelaps Breddin, P. sumizome Esaki).
- 1960. Ptilomera pamphagus, Matsuda, Univ. of Kansas Sci. Bull. 41(2):267, 539 (figs. 623, 625) 541 fig. 635.

Redescription of the types:

Size: Breddin gave the following: Length of female 15.00 mm.; length of middle femur 21.00 mm.; hind femur 22.5 mm.; length of male 16.5 mm.; length of middle femur 23.5 mm.; hind femur 28.5 mm. Our measurements follows:

Female. Length 15.23 mm.; width of head 2.26 mm.; width of pronotum 2.43 mm.; length of mesonotum 3.38 mm.; greatest width of body across mesoacetabula 4.12 mm.

Male. Length 16.76 mm.; width of head 2.43 mm.; width of pronotum 2.76 mm.; length of mesonotum 3.33 mm.; greatest width of body across mesoacetabula 4.00 mm.

Color: Quite typical for the genus. Head and thorax yellowish brown with the usual black markings. Head with clypeus, antennal sockets and two converging lines on vertex black. The black band on anterior margin of pronotum, anterior lateral margins of mesoand metanotum largely covered by a silvery silky pubescence. The lateral black band of thorax and abdomen with conspicuous band PLATE XXII



Ptilomera (Ptilomera) pamphagus Breddin

FIG. 1. Female holotytpe, dorsal view.

FIG. 2. Male allotype, ventral view of genital segments. Note that the dorsolateral projections of pygofer extend at least one-fifth of their length beyond the lateral wings of suranal plate.

FIG. 3. Male allotype, dorsal view. Note the long, slender nearly crescent shaped paramere, their shafts and arms are inseparable.

FIG. 4. Female type, left side view of sixth and seventh abdominal segments.

FIG. 5. Female type, ventral view of sixth and seventh abdominal segments.

of silvery pubescence. Abdominal tergites black, with a median yellowish spot on segments two to seven in female and first six entirely black in male. The black area largely covered by silvery pubescence. Connexivum testaceous. Antennae dark brown to nearly black. Front femur testaceous with two dark longitudinal banks on the dorso-caudal side and a fainter one on the anterior ventral side. Other legs dark brown, the distal ends of femora paler. Entire venter covered with a silvery pubescence.

Structural characteristics: Relative lengths of antennal segments. Female: 1st:2nd:3rd:4th::138:33:44.3:30.7. Male: 1st:2nd:3rd:4th::152:38:46:34.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Female	7.47 mm.	6.29 mm.	4.10 mm.	1.86 mm.
Male	8.1 mm.	7.14 mm.	4.19 mm.	1.81 mm,
Middle leg	Femur	Hind leg		Femur
Female	21.19 mm.	Female		23.57 mm.
Male	24.29 mm.	Male		29.29 mm.

Female type. Length of thorax:Abdomen::130:148. Seventh abdominal tergite about equal to sixth. Connexival spine moderately long, arising from end of connexivum. Incission between the dorsolateral and ventrolateral lobes narrow and deep. Dorsolateral lobe short and definitely turned ventrad. Distal lobe of seventh abdominal sternite normal in size, directed dorsad and embraced by the lateral lobes.

Male allotype. Length of pregenital abdominal segments:Genital segments::91:83. Genital segments: Suranal plate with median lobe moderate in size, not plainly surpassing lateral lobes, the front and rear margins of which are not parallel. Pygofer as seen from below rather long and slender, its tip bluntly pointed. Dorsolateral projections of pygofer slender and long, in dorsal view extending one-fifth their length beyond the lateral wings of suranal plate. Paramere long and slender, its shaft and arm in one continuous curve, very unlike that of Lundblad's fig. 137 of a specimen from Sumatra which we have named *Ptilomera lundbladi* n. sp.

Comparative notes: This species is distinct from all others. The long, slender dorsolateral projection of the pygofer separates the male from other species and the lateral profile of seventh abdominal segment separates the female from other species.

Types: The types are apterous specimens. The female bears the label "Posso See 900 m. 9, II 95" and Breddin mentioned this as the

type locality in Celebes for *P. pamphagus*, and the specimen fits his figure. However, Breddin had labeled this specimen "*Ptilomera dorceus* Bredd. Typus," and Lundblad has correctly labeled it *Ptilomera pamphagus* and added a red label "Typus." The true type of *Ptilomera dorceus*, is an apterous female, was stated by Breddin to have come from "Matinang-Kette Südseite 800-1200 m. (Sar." Although Dr. Lundblad overlooked this type specimen we found it labeled by him *Ptilomera orbasus* Breddin, and have redescribed and illustrated it. The male type of *P. pamphagus* bears a label "Posso See" and was recognized by Lundblad as this species and he placed a red "Typus" label and his own determination label upon it.

Distribution: Known only from the type localities in Celebes.

Ptilomera (Ptilomera) sumizome * Esaki

Plate XXIII

- 1925. Ptilomera sumizome Esaki, Philippine Jour. Sci. 26(1):59, Pl. 1, fig. 7(3), fig. 8(9). (Described from South-East Celebes.)
- 1927. Ptilomera sumizome Esaki, Eos, Rev. Esp. Ent. 3(3):261.
- 1933. Ptilomera sumizome Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 419. (Made this a synonym of P. pamphagus Breddin).

Dr. Lundblad did not see the types of this species, but placed it as a synonym of *P. pamphagus* Breddin because it falls within the wide range of variability of the female he ascribed to *P. pamphagus* Breddin. Since Dr. Esaki described his species as black we questioned this synonymy for we had never seen a truly black species.

Thanks to the kindness of Mr. T. Hidaka we have been permitted to study the holotype male and a paratype female of this species which bear the labels "S. O. Celebes T. Elbert 2, 1, 1900, 31" and "Property of the Ent. Lab. Kyushu Univ." We find the types are not really black, but such a dark chocolate brown that the black spots of the generic pattern are inconspicuous, but as usual, covered with a silvery pile. The structural characters show this to be a distinct species.

Redescription of types:

Size: Male holotype (apterous): Length 14.29 mm.; width of head 2.24 mm.; width of pronotum 2.57 mm.; length of mesonotum 3.1 m.; greatest width of body across mesoacetabula 3.57 mm.

Female paratype (apterous): Length 13.14 mm.; width of head 2.05 mm.; width of pronotum 2.05 mm.; length of mesonotum 2.86 mm.; greatest width of body across mesoacetabula 3.48 mm.

^{*} In the Japanese language sumizome means "stained with Chinese ink which is black."

Ptilomera (Ptilomera) sumizome Esaki

FIG. 1. Female paratype.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype, dorsal view.

FIG. 4. Male holotype, lateral view of genital segments. Note the elevated caudal section of the dorsum of first genital segment.

FIG. 5. Female paratype, ventral view of distal abdominal segments.

FIG. 6. Female paratype, lateral view of right side of distal abdominal segments.

FIG. 7. Male holotype parameres.

PLATE XXIII



Color: Ground color dark chocolate brown, nearly black. The black spot pattern which characterizes this genus very faint but marked by the silvery pubescence which usually cover such spots. Antennae and legs also nearly black, with the longitudinal black lines of the front femur faintly discernible. In lateral view all acetabula black, more or less covered by silvery pubescence. The longitudinal black band of meso- and metapleura covered medially by a band of long silvery pubescence. Ground color of venter of thorax and abdomen black, almost obscured by a frosty pubescence. *Structural characteristics:* Relative lengths of antennal segments.

Male: 1st:2nd:3rd:4th::140:33:42:28.

Female: 1st:2nd:3rd:4th::120:31: ?: ?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male (holotype)	7.43 mm.	6.29 mm.	$3.8 \mathrm{mm}$.	1.62 mm.
Female (paratype)	$6.29 \mathrm{mm}.$	$5.33 \mathrm{mm}$.	$3.05 \mathrm{mm}.$	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Male (holotype)	21.33 mm.	Male (holot	ype)	25.71 mm.
Female (paratype)	17.71 mm.	Female (par	ratype	19.28 mm.

Male holotype. Length of pregenital abdominal segments:Genital segments::65:78. Genital segments: Suranal plate with median lobe small, but slightly surpassing the lateral wings; lateral wings short, their anterior and posterior margins not parallel. Pygofer with its dorsolateral projections before its middle and not longer than the lateral wings of suranal plate when viewed from above; distal half of pygofer slender, its caudal tip pointed. Paramere very hairy, its exact shape difficult to see, but both shaft and arm are stout, the latter rounded at tip. (See Plate XXIII, fig. 7.) Distal half of dorsum of first genital segment abnormally elevated.

Female paratype. Length of thorax:Abdomen::116:132. Seventh abdominal tergite a little shorter than sixth. Connexival spine of moderate length, arising from the end of the connexivum. Both dorsolateral and caudolateral lobes present, the former short and directed ventrad. An incission separating the lobes moderately narrow. (Plate XXIII fig. 6).

Comparative notes: In the key to males this species runs out in couplet 24 with *P. harypia* Schmidt and in the key to females it runs out in couplet 41 which leads also to *P. sumbaensis* n. sp. and *P. pamphagus* Breddin.

Types: The types are in the Entomological Laboratory of Kyushu University, Fukuoka, Japan.

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Distribution: Known only from the types which came from Southeast Celebes.

Ptilomera (Ptilomera) sumatranus n. sp.

Plate XXIV

Size: Male holotype (apterous): Length 16.29 mm.; width of head 2.19 mm.; width of pronotum 2.48 mm.; length of mesonotum 3.71 mm.; greatest width of body across mesoacetabula 4.14 mm.

Female allotype (apterous): Length 15.24 mm.; width of head 2.12 mm.; width of pronotum 2.24 mm.; length of mesonotum 3.48 mm.; greatest width of body across mesoacetabula 4.14 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::168:41:55:32.

Female: 1st:2nd:3rd:4th::148:33:41:31.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male	8.48 mm.	7.33 mm.	4.52 mm.	1.76 mm.
Female	7.81 mm.	6.43 mm.	4.33 mm.	1.67 mm.
Middle leg	Femur	Hind leg		Femur
Male	25.24 mm.	Male		30.10 mm.
Female	21.19 mm.	Female		23.10 mm.

Male. Length of pregenital segments of abdomen:Genital segments::84:72. Genital segments: Suranal plate with median lobe of moderate size. Lateral wings of suranal plate not surpassing caudally the median lobe, their front and rear margins not parallel. Pygofer, as seen from below, normal in shape and its caudal tip blunt. Dorsolateral projections of pygofer slender, pointed and extending laterally about as far as lateral wings of suranal plate; shaft of paramere longer than the laterally turned arm. In rear view the arm has a distinct keel on its lower margin as shown on Plate XXIV fig. 4.

Female. Length of thorax:Abdomen::130:158. Seventh abdominal tergite subequal to the sixth tergite. Connexival spine of moderate length arising from end of connexivum. Dorsolateral lobe short, directed obliquely downward, separated from ventrolateral lobe by a narrow deep incission. The distal lobe of seventh abdominal sternite of usual size and shape and partly covered by the lateral lobes. If seen from the rear its distal margin is truncate and not pointed. Ptilomera (Ptilomera) sumatranus n. sp.

FIG. 1. Female allotype, dorsal view.

FIG. 2. Male holotype, ventral view of genital segments.

FIG. 3. Male holotype, dorsal view.

FIG. 4. Rear view of left paramere.

FIG. 5. Side view of right paramere.

FIG. 6. Female allotype, ventral view of sixth and seventh abdominal segments.

FIG. 7. Female allotpe, left side view of sixth and seventh abdominal segments.

PLATE XXIV



Comparative notes: This is one of several closely related species from Sumatra that would be puzzling if not accompanied by males.

Types: An apterous holotype male and an apterous female allotype and two paratypes ($\mathcal{J} - \mathcal{Q}$) bear the label: "Sud-Sumatra, Lampongs. Mt. Tenggamoes. M. E. Walsh, 15-2000 ft." The holotype and allotype are in the Natural History Museum, Basel, Switzerland. Doctors Sutter and Keiser have given the paratypes to University of Kansas collection.

Distribution: Known only from the type locality.

Ptilomera (Ptilomera) lundbladi n. sp. Plate XXV

Lundblad's fig. 136B and 137 were reproduced from Archiv für Hydrobiologie, Suppl. Bd. 12:427-428 (1933). In fig. 136B is a side view figure of the seventh segment of a female that came from Subang Ajam, Sumatra that Dr. Lundblad figured as only a variation of *P. pamphagus* Breddin. In fig. 137 he figured the genitalia of a male from the same place and labeled it *P. pamphagus*. Had he examined the paramere of the type of *P. pamphagus* he would have found that the male from Celebes is quite unlike his male from Sumatra. Therefore, we offer the name *P. lundbladi* for the species indicated above identified by Lundblad as *Ptilomera pamphagus* which it cannot be.

By the generosity of Dr. O. Lundblad of Stockholm, Sweden, we have been permitted to reproduce his text figures 136 and 137 on this plate. Since figure 136B and figure 137 are not *P. pamphagus* Breddin but an undescribed species we have named it in his honor.

Ptilomera (Ptilomera) laelaps Breddin

Plate XXVI

- 1901. Ptilomera laelaps Breddin, Abh. Naturf. Ges, Halle, 24:20, 88-89. Taf. 1, fig. 13 (Lists on p. 20, described male from Celebes on pp. 88-89).
- 1903. Ptilomera laelaps, Breddin, Societas Entomologica 17(19):147. (Described female from Samanga, S. Celebes).
- 1927. Ptilomera laelaps, Esaki, Eos, Rev. Esp. Ent. 3(3):260.
- 1933. Ptilomera laelaps, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372-73, 419-21. (Gave as synonym of P. pamphagus).

In his paper "Die Hemipteren von Celebes" Dr. Breddin described the male from "S. Loka, 1000-3000 m. Okt. 95 (Sar); Makassar (Coll. Breddin)." In 1903 he described the female from

PLATE XXV



Fig. 137. Ptilomera pamphagus Bredd. & (apter). A Kniegelenk des Vorderbeins; B Genitalkapsel von oben (Penis schwarz; linker Genitalgriffel entfernt); C Distalende der Genitalkapsel; D linker Genitalgriffel; E Analplatte.

Nach einem Expl. aus Subang Ajam, Tjurup, Sumatra.



Fig. 136. Ptilomera pamphagus Bredd. QQ (apter).
A die Type von pamphagus; B nach einem Expl. aus Subang Ajam,
Sumatra; C—D aus dem Wai Negri, Sumatra; E aus Balige, Sumatra; F aus Umbilin, Sumatra; G die Type von oribasus; H aus Balige, Sumatra;

I die Type von laelaps.

Ptilomera (Ptilomera) laelaps Breddin

FIG. 1. Female allotype, dorsal view. Note the very short connexival spines.

FIG. 2. Female allotype, ventral view of sixth and seventh abdominal segments.

FIG. 3. Male holotype, dorsal view.

FIG. 4. Male holotype, ventral view of genital segments.

FIG. 5. Male holotype, dorsal view of genital segments.

FIG. 6. Male holotype, rear view of arms of the parameres.

Fig. 7. Female allotype, side view of sixth and seventh abdominal segments.

PLATE XXVI



S. Celebes (Samanga). Fortunately, we found in our Kirkaldy Collection 1 apterous male and 3 apterous females and one macropterous male bearing the identical label of the female type "Samanga S. Celebes Nov. 1895 H. Fruhstorfer" and one apterous male bearing the label "S. Celebes Bua-Kraeng 5000 ft. Feb. 1896, H. Fruhstorfer." The males of our series are like the male type and the three females are like the female type and show no recognizable variation in the length of the connexival spine.

Redescription

Size: Female type (apterous): Length 14.38 mm.; width of head 2.02 mm.; width of pronotum 2.10 mm.; length of mesonotum 2.90 mm.; greatest width of body across mesoacetabula 3.62 mm.

Male (apterous): Bearing the same collector's label as the female type. Length 15.24 mm.; width of head 2.10 mm.; width of pronotum 2.43 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesoacetabula 3.71 mm.

Male (macropterous): From the same place as above. Length including wings 15.14 mm.; width across head 2.10 mm.; width across humeri 3.14 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Female type (apterous): 1st:2nd:3rd:4th::125:28:40:27. Male (apterous): 1st:2nd:3rd:4th::132:33.5:43:30.

Male (macropterous): 1st:2nd:3rd:4th::123:32:40:29.

Front leg	Femur	Tibia	segment	segment
Female type	6.90 mm.	5.71 mm.	3.33 mm .	1.48 mm.
Male (apterous)	7.29 mm.	6.19 mm.	3.43 mm.	1.52 mm.
Male (macropterous)	6.86 mm.	5.81 mm.	3.10 mm.	1.43 mm.
Middle leg	Femur	Hind leg		Femur
Female type	19.1 mm.	Female type		20.5 mm.
Male (apterous)	20.47 mm.	Male (apter	ous)	24.00 mm.
Male (macropterous)	18.57 mm.	Male (macro	opterous)	21.67 mm.

Actual Lengths of Leg Segments

Length of pregenital abdominal segments: Genital seg-Male. ments::80:62. Genital segments: Suranal plate not large but surpassing caudally broad short lateral wings which have their front and rear margins not parallel. Pygofer with its dorsolateral projections short; pygofer, as seen from below, not conspicuously broad beyond its middle, its venter of usual shape and its tip roundly pointed. Paramere with shaft relatively slender and not sharply separated from its arm, not shaped like that of P. harpalos Schmidt which runs out also in couplet 19 of the key. First genital segment with its dorsal line but little elevated in caudal half as seen from side; venter short, its median longitudinal keel broad.

Female. Length of thorax:Abdomen::128:148. Seventh abdominal tergite as long as sixth. Connexival spine stout, short, plainly shorter than seventh tergite, not half as long as upper margin of dorsolateral lobe from base of connexival spine to its tip. Dorsolateral and ventrolateral lobes short, the latter represented by a convex curve in caudal margin and separated from the former by a broad shallow incission. Dorsolateral lobe directed obliquely downward. Distal lobe of seventh sternite moderately small, its sides slightly converging and slightly concave, its distal end slightly convex.

Comparative notes: This species is related to *P. harpalos* Schmidt and runs out to couplet 19 in the key to males and to couplet 15 in the key to females.

Types: One apterous male one apterous female. Types are in the Deutsches Entomologisches Institut, Berlin.

Distribution: Besides the types we have one apterous male and three apterous females and one macropterous male bearing the identical label of the female type. "Samanga, S. Celebes Nov. 1895 H. Fruhstorfer" and one apterous male bearing the label "S. Celebes, Bua-Kraeng 5000 ft. Feb. 1896 H. Fruhstorfer."

Ptilomera (Ptilomera) harpalos Schmidt

Plate XXVII

- 1926. *Ptilomera harpalos* Schmidt, Ent. Mitt. 15(1):66. (Described from Sumatra).
- 1927. Ptilomera harpalos, Esaki, Eos, Rev. Esp. Ent. 3(3):260.
- 1933. Ptilomera harpalos, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 373, 419, 420.
- 1960. Ptilomera harpalos, Matsuda, Univ. Kansas Sci. Bull. 41(2):267, 539, fig. 627.

Redescription:

Size: Schmidt gives the length of male type 15.5 mm.; greatest width 4.00 mm.; hind femur 27.00 mm. Length of female 15.5 mm.; greatest width 3.5-4.0 mm. (he had two females); hind femur 23.00 mm. We give the following measurements for the types. We must accept Schmidt's measurement for the length of body because he removed and mounted the genital segments on slides.

Male type (apterous): Length 15.5 mm.; width of head 2.14 mm.; width of pronotum 2.33 mm.; length of mesonotum 3.67 mm.; great-

Ptilomera (Ptilomera) harpalos Schmidt

FIG. 1. Female from Sumatra, Si Rambé. Dorsal view.

FIG. 2. Male type. Genital segment drawn from slide mount.

FIG. 3. Male from Sumatra, Si Rambé. Dorsal view.

FIG. 4. Female from Sumatra, Si Rambé. Ventral view of sixth and seventh abdominal segments.

FIG. 5. Male from Sumatra, Si Rambé. Enlarged drawing of paramere of figure 3.

FIG. 6. Female from Sumatra, Si Rambé. Side view of sixth and seventh abdominal segments.

FIG. 7. Male from Sumatra, Si Rambé. Ventral view of genital segments.

FIG. 8. Female type. Dorsal view of abdominal tip drawn from slide mount.

PLATE XXVII



est width of body across mesoacetabula 3.90 mm. Female type (apterous). Length 15.5 mm.; width of head 2.05 mm.; width of pronotum 2.05 mm.; length of mesonotum 3.43 mm.; greatest width of body across mesoacetabula 3.86 mm. We give below the measurements of a pair from our Kirkaldy Collection bearing the label "Dr. Hagen, Toba-meer Sumatra inter."

Male (apterous). Length 14.29 mm.; width of head 2.1 mm.; width of pronotum 2.31 mm.; length of mesonotum 3.48 mm.; greatest width of body across mesoacetabula 3.57 mm. Female (apterous). Length 15.33 mm.; width of head 2.00 mm.; width of pronotum 2.12 mm.; length of mesonotum 3.38 mm.; greatest width of body across mesoacetabula 3.62 mm.

Color: Typical of the genus.

Structural characteristics: Relative lengths of antennal segments. Male type: 1st:2nd:3rd:4th::147:35: ?: ?.

Female type: 1st:2nd:3rd:4th::138:31:45:32.

Male (Kirk. Coll.): 1st:2nd:3rd:4th::137:37:50:30.

Female (Kirk. Coll.): 1st:2nd:3rd:4th::120:28:37:29.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male type	8.00 mm.	7.14 mm.	4.19 mm.	1.67 mm.
Male (Kirk, Coll.)	7.60 mm.	6.60 mm.	3.90 mm.	1.60 mm.
Female type	$7.62 { m mm}$.	6.57 mm.	$4.00 \mathrm{mm}$.	1.62 mm.
Female (Kirk. Coll.)	6.80 mm.	5.70 mm.	3.70 mm.	1.52 mm.
Middle leg	Femur	Hind leg		Femur
Male type	22.38 mm.	Male type .		28.1 mm.
Male (Kirk. Coll.)	19.38 mm.	Male (Kirk.	Coll.)	22.86 mm.
Female type	$21.33 \mathrm{mm}.$	Female type		23.09 mm.
Female (Kirk. Coll.)	17.62 mm.	Female (Kir	k. Coll.)	19.52 mm.

Male. Length of pregenital abdominal segments:Genital segments::83:64. Genital segments: Suranal plate not large but surpassing caudally short lateral wings which have their front and rear margins not parallel. Pygofer with its dorsolateral projections short; pygofer as seen from below not conspicuously broad beyond its middle, its venter of usual shape, its tip roundly pointed. Paramere with exposed part of shaft stout, short and broad, its lateral margin abruptly turned mesally to form the base of the arm which turns laterally. First genital segment with its dorsal line nearly straight, caudal half only elevated, venter short, its median longitudinal keel broad.

Female. Length of thorax:Abdomen::125:160. Seventh abdominal tergite about as long as sixth. Connexival spine relatively short, slender and sharp pointed, usually at least half as long as upper margin of dorsolateral lobe from base of connexival spine to its tip. Dorsolateral lobe stout and short, directed obliquely downward; ventrolateral lobe short, nearly rectangular at tip and separated from dorsolateral lobe by a broad shallow incission that is deeper than that of *P. laelaps* Breddin.

Comparative notes: This species is a near relative of *P. laelaps* Breddin from which it differs in both sexes. The paramere has the exposed portion of its shaft short and broad, with its distolateral margin abruptly turned mesad to form the base of arm. The paramere in *P. laelaps* is different as seen in the key. The female has a longer and more slender connexival spine than in *P. laelaps*.

Types: One male and one female types bear the label "Dohrn Sumatra. Sinabong." One female with the label "Soekaranda, Jan. 1894 Dohrn." All apterous. All types are at the Polish Academy of Sciences, Warsaw, Poland.

Distribution: Besides the types we have the following from Sumatra. "Dr. B. Hagen Toba-meer, Sumatra inter." $1 \\ \mathcal{E}$, $2 \\ \mathcal{Q} \\ \mathcal{Q}$, (all apterous) (K. U. Kirkaldy Collection); "Sumatra Si-Rambe XII 90 III 91 E. Modigliani" $1 \\ \mathcal{E}$, $3 \\ \mathcal{Q} \\ \mathcal{Q}$, (apterous) (K. U. Kirkaldy Collection); "Sibolga Tapianoeli Sumatra 9, 16, 31 v. d. Meer Mohr" $2 \\ \mathcal{Q} \\ \mathcal{Q}$ (apterous) (K. U. Coll.); Near Sembahe, E. coast Sumatra 6.7 '31 v. d. Meer Mohr, $1 \\ \mathcal{E}$ (apterous) (K. U. Coll.).

Ptilomera (Ptilomera) oribasus Breddin

Plate XXVIII, figs. 1, 2, 3, 5, 6, 7

- 1901. Ptilomera oribasus Breddin, Abh. Naturf. Ges. Halle, Bd. 24:20,88. Taf. 1 fig. 12 9. (Described from Celebes).
- 1927. Ptilomera oribasus, Esaki, Eos, Rev. Esp. Ent. 3(3):260.
- 1933. Ptilomera oribasus, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 373, 419-21. (Gave as synonym of P. pamphagus Breddin).

Breddin's collection contains two female specimens, each with a red "type" label. One bears the written label "Celebes. Sudl. Vorberge der Takalekadjo-Kette 1000 m. 7 II 95 Leg. Sarasin," and "Ptilomera oribasus Breddin Typus," in Breddin's handwriting. This specimen is the one Breddin drew and also the one Lundblad drew. The other female specimen bears the labels, "Celebes Natinang-Kette Seite 800-1200 m. (Sar.)." It also bears a label "Ptilomera oribasus Bred." which is not Breddin's writing. It looks like Dr. Lundblad's printing. He is the only one who has written on these types. However, this female fits Breddin's figure of Ptilomera dorceus and bears the type locality label of this species. Dr. Lundblad must have overlooked this specimen because he said on page

Ptilomera (Ptilomera) oribasus Breddin

- FIG. 1. Female allotype, dorsal view.
- FIG. 2. Male neallotype, dorsal view.
- FIG. 3. Male neallotype, ventral view of genital segments. (Brit. Mus.)
- FIG. 5. Male neallotype, dorsal view of left paramere.
- FIG. 6. Female type, side view of sixth and seventh abdominal segments.
- FIG. 7. Female type, ventral view of sixth and seventh abdominal segments.

Ptilomera (Ptilomera) dorceus Breddin

- FIG. 4. Female type, dorsal view.
- FIG. 8. Female type, lateral view of sixth and seventh abdominal segments.
- FIG. 9. Female type, ventral view of sixth and seventh abdominal segments.

GENUS PTILOMERA AMYOT AND SERVILLE

PLATE XXVIII



419 of his great work "Zur Kenntnis der Aquatilen und Semiaquatilen Hemipteren von Sumatra, Java, und Bali 1933," that the only species of *Ptilomera* unknown to him were *P. tigrina*, *P. dorceus*, and *P. sumizome*. We have now before us the types of all three of these as well as the type of *P. oribasus* Breddin which is a female.

In addition we have had the good fortune of finding the undetermined material of the British Museum a male and female of this species and have labeled the female "*P. oribasus* Breddin" and "compared with Type." We have labeled the male "*P. oribasus*" "Neallotype." Both specimens bear the label "F. C. Drescher Zuid Celebes Nanggala 900 m. Rantepao VI 1937." Therefore, a more complete description of the species follows:

Size: Female type (apterous): Breddin says length is 14.00 mm.; middle femur 18.5 mm.; hind femur 21.5 mm. Our measurements for this type: Length 13.81 mm.; width of head 2.05 mm.; width of pronotum 2.17 mm.; length of mesonotum 3.05 mm.; greatest width of body across mesoacetabula 3.90 mm.

Male neallotype (apterous): Length 15.71 mm.; width of head 2.31 mm.; width of pronotum 2.43 mm.; length of mesonotum 3.29 mm.; greatest width of body across mesoacetabula 4.09 mm.

Apterous female taken with neallotype. Length 14.86 mm.; width of head 2.14 mm.; width of pronotum 2.24 mm.; length of mesonotum 3.19 mm.; greatest width of body across mesotabula 4.19 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Female type: 1st:2nd:3rd:4th::127:27: ?: ?.

Male neallotype: 1st:2nd:3rd:4th::152:35:48: ?.

Female came with neallotype lost antennae.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Female type	7.14 mm.	$6.1 \mathrm{mm}.$	3.57 mm.	$1.52 \mathrm{mm}$.
Male nealfotype	$7.85 \mathrm{mm}$.	6.66 mm.	4.38 mm.	1.67 mm.
Female came with above,	$7.00 \mathrm{~mm}.$	$5.85 \mathrm{mm}$.		
Middle leg	Femur	Hind leg		Femur
Female type	$18.81 { m mm}$.	Female type		22.14 mm.
Male neallotype	22.71 mm.	Male neallot	ype	28.57 mm.
Female came with		Female came	e with	
neallotype	18.81 mm.	neallotype		20.81 mm.

Female type (apterous). Length of thorax:Abdomen::120:137. Female came with male neallotype (apterous). Length of thorax: Abdomen::120:140. Female (apterous). Length of thorax:Length of abdomen::122: 146. Seventh abdominal tergite as long as sixth. Connexival spine arising from end of seventh connexivum and at least half as long as upper margin of dorsolateral lobe from base of connexival spine to its tip. An incission separating the dorsolateral and ventrolateral lobes of seventh abdominal segment wide. Dorsolateral lobe short, slender and sharply pointed. Distal lobe of the seventh abdominal sternite of usual size and embraced by lateral lobes.

Male neallotype (apterous). Length of pregenital abdominal segments:Genital segments::78:73. Genital segment: Suranal plate with median lobe not large, but surpassing lateral wings caudally; lateral wing with front and rear margins nearly parallel, the rear margin a little longer than width of its tip. Pygofer with its dorso-lateral projections short but surpassing lateral wings of suranal plate and ending in a dense brush of long hair. Pygofer, as seen from below, not broad beyond its middle, but appearing rather elongate and its tip pointed. Venter of genital segments without a complete keel on the first genital.

Comparative notes: This species which came from Celebes appears to have its nearest relatives in New Guinea. See couplet 17 of key to males. However, in the key to females, which is certainly not a phylogenetic key, it is not far removed from two New Guinea forms before it and two New Guinea species after it.

Types: The apterous female type bears the label "Celebes Sudl. Vorberge der Takalekadjo-Kette 1000 m. 7 II 95 Leg. Sarasin." They are in the Deutsches Entomologisches Institut, Berlin. The apterous male neallotype and a female taken with it bear the label "F. C. Drescher. Zuid Celebes Nanggala 900 m. Rantepao VI 1937. These are in the British Museum.

Distribution: Known only from the above type localities.

Ptilomera (Ptilomera) dorceus Breddin

Plate XXVIII, figs. 4, 8, and 9

1901. Ptilomera dorceus Breddin, Abh. Naturf. Ges. Halle, 24:20, 87-88. Taf. 11a, 11b. (Described \$\varphi\$ from Celebes and figured genital segments.)
1927. Ptilomera dorceus, Esaki, Eos, Rev. Esp. Ent. 3(3):260.

1933. Ptilomera dorceus, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:372, 420.

Dr. Lundblad did not know *P. dorceus* Breddin but believed it to be the same as *P. dromas* Breddin 1903 which he knew. However, since we found what we believe to be four good species on his fig. 136 (all nine drawings of which he thought were variations of *P. pamphagus* Breddin), we are inclined to question some of the variations of *P. dromas* Breddin in Lundblad's fig. 134. We believe that since we have keyed out the female type of *P. dorceus* Breddin, we must consider it a species until it is taken together with some males from Celebes that prove otherwise. We therefore offer the following notes on this female type:

Size: Breddin gave its body length as 14.00 mm., middle femur 17.5 mm., hind femur 19.5 mm. Our measurements: Length of body 14.29 mm.; width of head 2.05 mm.; width of pronotum 2.12 mm.; length of mesonotum 2.90 mm.; greatest width of body across mesoacetabula 3.67 mm.

Color: Typical for the genus. This specimen has two broad black converging bands on vertex. The black bands on anterior margin of pronotum medially joined. The black band on the side of mesothorax separated by a longitudinal silvery dense pubescence, beneath which there shows no yellow stripe, the usual black band is almost obliterated by white pubescence that continues on the venter.

Structural characteristics: Relative length of antennal segments. Female type: 1st:2nd:3rd:4th::123:29:41:27.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Female type	6.86 mm.	5 .9 mm.	3.29 mm.	1.48 mm.
Middle leg	Femur	Hind leg		Femur
Female type	18.19 mm.	Female type		19.52 mm.

Female. Length of thorax:Abdomen::112:152. Seventh abdominal tergite slightly longer than sixth. Connexival spine moderately long, arising from end of connexivum. Incission between dorsoand ventrolateral lobes not as deep as broad. Dorsolateral lobe of seventh abdominal segment only moderately long, its upper margin from base of connexival spine to its tip much less than twice as long as connexival margin of seventh abdominal segment. The dorsolateral lobe rather slender and spine-like. The ventrolateral lobe short, bluntly pointed; in side view it is shorter than the venter of the seventh abdominal segment; in ventral view the ventrolateral lobe is not broad. Distal lobe of seventh abdominal sternite of usual size and shape, directed vertically and embraced by the lateral lobes. We regret that the male of this Celebes species is unknown.

Comparative notes: This species must be a near relative of *P*. dromas Breddin from Java but until we have both males and females of this species from Celebes we cannot determine how near. *Type:* Apterous female from "N. Celebes, Matinang-Kette Sudseite 800-1200 m. (Sar)." In the Deutsches Entomologisches Institut, Berlin.

Distribution: Known only from the above place.

Ptilomera (Ptilomera) dromas Breddin

Plates XX1X and XXX

- 1901. *Ptilomera dromas* Breddin, Abh. Naturf. Ges. Halle, Bd. 24, Taf. 1, 14 a, b. (While his title was "Die Hemipteren von Celebes" *P. dromas* n. sp. came from Java as he explained in 1903).
- 1903. Ptilomera dromas Breddin, Soc. Ent. 17(9):147. (Refers to above and described male and female from East and South Java).
- 1905. *Ptilomera dromas* Breddin, Mitt. Naturh. Mus. Hamburg, 22:131-32. (Redescribed both sexes from Java.).
- 1915. *Ptilomera dromas*, Bergroth, Zool. Med. Leiden, 1-3:123. (Noted that Distant and old authors figured male as female and vice versa in this genus).
- 1927. Ptilomera dromas, Esaki, Eos, Rev. Esp. Ent. 3(3):260.
- 1929. Ptilomera dromas, Dover, Treubia 10(1):69.
- 1933. Ptilomera dromas, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:423, Taf. 13, figs. 134-35. (Suggested that P. argus Breddin and P. asbolus Breddin are synonym and we agree).
- 1960. Ptilomera dromas, Matsuda, Univ. Kansas Sci. Bull. 41(2):267, 537, figs. 539, 610, 622.
 - The following synonymies also belong here.
- 1903. Ptilomera argus Breddin, Societas Entomologica 17(19):147-48. (Described male from W. Java).
- 1905. *Ptilomera argus* Breddin, Mitt. Naturh, Mus. Hamburg. 22:134. (Repeated description of male in 1903).
- 1927. Ptilomera argus, Esaki, Eos Rev. Esp. Ent. 3(3):260.
- 1933. Ptilomera argus, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:371. (Saw type and thought it is only an unusually small example of *P. dromas* Breddin).
- 1905. *Ptilomera asbolus* Breddin, Mitt. Naturh. Mus. Hamburg 22:132-34, figs. 10-11. (Drawings of male and female genital segments of specimens from Java).
- 1927. Ptilomera asbolus, Esaki, Eos, Rev. Esp. Ent. 3(3):260.
- 1933. Ptilomera asbolus, Lundblad, Arch. Hydrobiol. Suppl. Bd. 12:373, 421. (Said is syn. of P. dromas Breddin).

When we first examined the male and female types of *P. dromas* Breddin from East Java, a male of *P. argus* Breddin from West Java, and a female of *P. asbolus* Breddin from Java we found that while *P. asbolus* was described and figured for both sexes the male is not now present in the Breddin collection. We also thought that *P. dromas* and *P. argus* were different species and that *P. asbolus* was a synonym of *P. argus*. However, when we tried to key out *P. dromas* and *P. argus* we found it impossible to do so and have reached the conclusion that both *P. argus* and *P. asbolus* are synonyms of *P. dromas*.

We offer the following descriptions of various types.

PLATE XXIX

Ptilomera (Ptilomera) dromas Breddin

FIG. 1. Female type, dorsal view.

FIG. 2. Female type, ventral view of sixth and seventh abdominal segments.

FIG. 3. Male type, dorsal view of genital segments.

FIG. 4. Male type, dorsal view.

FIG. 6. Male type, arm of left paramere as seen from the rear.

FIG. 7. Male type, genital segments in ventral view.

FIG. 8. Female type, sixth and seventh abdominal segments as seen from left side.

Ptilomera (Ptilomera) asbolus Breddin

FIG. 5. Female type, showing sixth and seventh abdominal segments from left side.

Ptilomera (Ptilomera) argus Breddin

FIG. 9. A female from Buitenzorg, Java, that was taken with males that are the same as the P. argus type. Drawing shows sixth and seventh abdominal segments seen from left side.

FIG. 10. The same female showing a ventral view of the same segments.
PLATE XXIX



PLATE XXX

Ptilomera (Ptilomera) dromas Breddin

Showing that *Ptilomera argus* Breddin is a synonym and that the species occurs in Borneo as well as in Java.

FIG. 1. Female from West Borneo, dorsal view.

FIG. 2. Another female from the same place.

FIG. 3. Male type of *P. argus* Breddin.

FIG. 4. Female from Buitenzorg, Java.

FIG. 5. Male type of P. argus Breddin, dorsal view of genital segments.

FIG. 6. Arm of left paramere of above seen in rear view.

FIG. 7. Female from West Borneo showing venter of sixth and seventh abdominal segments.

FIG. 8. Left side view of above.

FIG. 9. Male type of *P. argus* Breddin showing ventral view of genital segments.

PLATE XXX



Types of Ptilomera dromas Breddin

Size: Male type (apterous): Length 16.67 mm.; width of head 2.29 mm.; width of pronotum 2.67 mm.; length of mesonotum 3.71 mm.; greatest width of body across mesoacetabula 4.20 mm. Length of pregenital abdominal segments:Genital segments::93:84.

Female type (apterous): Length 15.24 mm.; width of head 2.10 mm.; width of pronotum 2.21 mm.; length of mesonotum 3.10 mm.; greatest width of body across mesoacetabula 4.00 mm. Length of thorax:Abdomen:123:161.

Color: Color and color pattern are typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male: 1st:2nd:3rd:4th::158:37: ?: ?. Female: 1st:2nd:3rd:4th::138:30: ?: ?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Male type	8.33 mm.	7.14 mm.	4.43 mm.	1.76 mm.
Female type	$7.24 \mathrm{mm}$.	6.33 mm.	$3.71 \mathrm{~mm}$.	$1.57 \mathrm{mm}$.
Middle leg	Femur	Hind leg		Femur
Male type	22.86 mm.	Male type		28.10 mm.
Female type	19.19 mm.	Female type		21.19 mm.

The male type of *P. dromas* has the seventh abdominal tergite plainly shorter than the three preceding segments together. Length of pregenital abdominal segments:Genital segments::93:84.

Female. Length of thorax:Abdomen::123:161. Seventh abdominal tergite as long as sixth.

Male type of *Ptilomera argus* Breddin (apterous)

Size: Length 14.05 mm.; width of head 1.95 mm.; width of pronotum 2.05 mm.; length of mesonotum 2.90 mm.; greatest width of body across mesoacetabula 3.14 mm.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments. Male type: 1st:2nd:3rd:4th::120: ?: ?. The type has now only the first segment.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	segment
Front leg	$6.75 \mathrm{mm}.$	$5.60 \mathrm{mm}.$	$2.95 \mathrm{mm}.$	1.30 mm.
Middle leg	17.38 mm.			
Hind leg	20.24 mm.			

GENUS PTILOMERA AMYOT AND SERVILLE

The male type of *P. argus* has the seventh abdominal tergite nearly as long as the three preceding tergites together. We thought this character might separate *P. dromas* and *P. argus* but it proved to be variable. Length of pregenital abdominal segments:Genital segments::76:64.

Female type of *Ptilomera asbolus* Breddin (apterous)

Size: Length 17.19 mm.; width of head 2.05 mm.; width of pronotum 2.10 mm.; length of mesonotum 3.14 mm.; greatest width of body across mesoacetabula 3.71 mm. Length of thorax:Abdomen:: 117:145.

Color: Typical for the genus.

Structural characteristics: Relative lengths of antennal segments: 1st:2nd:3rd:4th::127:30 ? : ?.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	lst tarsal segment	2nd tarsal segment
Front leg	6.90 mm.	$5.71 \mathrm{mm}$.	4.10 mm.	1.52 mm.
Middle leg	17.62 mm.			
Hind leg	20.00 mm.			

Since none of the types has an entire antenna we give the comparative lengths of antennal segments of specimens in our collection that most closely resemble the types.

The one that resembles the type of \hat{P} . dromas: male 1st:2nd:3rd: 4th::170:37:53:35; female 140:31:44:31.

The one that resembles the type of *P. argus*: male 1st:2nd:3rd: 4th::135:33:43:32; female 124:27:39:30. The above specimens came from the same place "Buitenzorg, Java." All three of these types have the following characteristics in common:

Male genital segments: Suranal plate with median lobe small, its lateral wings slightly surpassing median lobe; front and rear margins of lateral wings not parallel. Pygofer with its dorsolateral projections as seen from above short, apex of pygofer blunt. As seen from below pygofer not conspicuously broad beyond its middle; paramere with both shaft and arm rather stout.

Female. Length of thorax:Abdomen::118:149. Seventh tergite is nearly equal to sixth tergite in length. Connexival spines moderately long, arising from end of connexivum; dorsolateral lobe moderately long and spine-like, its upper margin from base of connexival spine to its tip much less than twice as long as upper connexival margin. With a ventrolateral lobe that is triangular; incission between dorsal and ventrolateral lobes broad and shallow; distal lobe of sternite of usual size and usually embraced by lateral lobes.

Comparative notes: This is the only species that occurs in Java. It was this slightly variable species and *P. pamphagus* Breddin complex of several species that made Dr. Lundblad believe that the taxonomy of this genus was quite hopeless.

Types: The types of *P. dromas, P. argus* and *P. asbolus* are all in the Breddin Collection of the Deutsches Entomologisches Institut in Berlin, Germany.

Distribution: Male and female types of *P. dromas* bear the label "Ost-Java Tengger Gebirg, H. Fruhstorfer." The male type of *P. argus* bears the label "Java occident. Sukabumi 2000' 1893, H. Fruhstorfer." The female type of *P. asbolus* bears the label "Java Foerster"; Breddin added Buitenzorg (Kraepelin). Beside the types we have seen the following apterous specimens:

Java: "Buitenzorg-Java, Apr. Dec. 96, D. G. Fairchild" $2 \not \exists \ d$, $4 \not \varsigma \not \varsigma$ (K. U. Torre-Bueno Coll.); $2 \not \sharp \ d$, $2 \not \varsigma \not \varsigma$ bearing the same label we have marked "*P. argus* compared with type"; "Muller, Java" $3 \not \sharp \ d$, $1 \not \varsigma$ (K. U. Kirkaldy Coll.); "Goeneg Niseere, Dampang W. Java 3, 1926 Mrs. M. E. Walsh" $1 \not \sharp$, $3 \not \varsigma \not \varsigma$ (K. U.); "Java Fruhstorfer G. Severin" $1 \not \varsigma$ (we labeled this *P. asbolus*, compared with type); "Giava, Sindana Java" $1 \not \varsigma$ (K. U. Coll.); "Buitenzorg Java" $3 \not \varsigma \not \varsigma$ (K. U. Kirkaldy Coll.); "Java Dr. H. Bos" $1 \not \varsigma$ (K. U. Kirkaldy Coll.); "Reinn Java" $1 \not \varsigma$ (K. U. Kirkaldy Coll.); "C. N. Java Moeria Mts. 1939, Tjolo 20-24 X, M. A. Lieftinck" $1 \not d$, $1 \not \varsigma$ (K. U. Coll.); "Buitenzorg Java 3. 09 Bryant and Palmer Coll." $1 \not d$ (K. U. Torre-Bueno Coll.); "Kediri, Java, $1 \not d$ (K. U. Kirkaldy Coll.); "Buitenzorg, Java, $1 \not g$ (K. U. Kirkaldy Coll.); "Buitenzorg Java 3. 09 Bryant and Palmer Coll." $1 \not d$ (K. U. Torre-Bueno Coll.); "Kediri, Java, $1 \not d$ (K. U. Kirkaldy Coll.); "Buitenzorg, Java, 1919 W. C. V. Heurn" $1 \not d 1 \not q$ (Calif. Acad. Sci.).

The following were loaned to us for study by Dr. Wegner, Director of the Zoological Museum in Bogor: "W. Java 8-900 m. Tjikadjang, Bandjarwangi 7-10, IV, 1939. M. A. Lieftinck"; $2 \xrightarrow{3} \xrightarrow{3}$, $3 \xrightarrow{9} \xrightarrow{9}$; "C. N. Java 800 Moeria Mts. 1939 Tjolo 20-24 X, M. A. Lieftinck" $2 \xrightarrow{3} \xrightarrow{3}$, $5 \xrightarrow{9} \xrightarrow{9}$. "W. Java 500 m. G. Sanggaboeana 22 XII 1935 M. A. Lieftinck" $7 \xrightarrow{9} \xrightarrow{9}$; "W. Java 700 m. Bandoeng 19 VII 1940 J. Olthof" $1 \xrightarrow{3}$; "W. Java 700 m. Bandoeng 16 and 23 VI" $6 \xrightarrow{3} \xrightarrow{3}$, $6 \xrightarrow{9} \xrightarrow{9}$; "Palaboean ratoe 30 V 1932 Tjijolak, Lieftinck" $1 \xrightarrow{9}$; "W. Java 400-1000 m. Soekangegora II 1940" $1 \xrightarrow{9}$; "Wetar I-IV 1939 m. Lerai S. Bloembergen" $1 \xrightarrow{3}$.

The following is from Dr. E. Sutter, Museum of Natural History, Basel, Switzerland: "Ost Java, Lawang Djati Forests, Nglirip 200' M. E. Walsh" 1 ♂; "Ost Java, Lawang 1500' M. E. Walsh" 1 φ ; "West Java Wijnkoops Bay, M. E. Walsh" 1 \mathcal{J} , 1 φ ; "West Java, G. Molang 4290, M. E. Walsh" 1 \mathcal{J} , 1 φ ; "Nord Java, Japora Distr. M. E. Walsh" 1 \mathcal{J} "West Java Soekaboemi M. E. Walsh" 1 \mathcal{J} ; Borneo: "W. Borneo. Telok Ayer F. Muir" 2 \mathcal{J} \mathcal{J} 1 φ , all apterous (Calif. Acad. Sci.).

Ptilomera (Ptilomera) werneri Hungerford and Matsuda

Plate XXXI

1958. Ptilomera werneri, Hungerford and Matsuda, Bull. Brooklyn Ent. Soc. 53:70-73. 2 plates. (Described from the Philippines).

1960. Ptilomera werneri, Matsuda, Univ. of Kansas Sci. Bull. 41(2):267, 539. fig. 629.

This was the first species we described in this genus and its distinctive characters were so surprising that we were encouraged to undertake this revision of the genus. Our description of the species was entirely adequate but followed a somewhat different outline from the one used in this paper. The types have been returned to the Chicago Natural History Museum and we have only a male paratype now available.

Size: Male type (apterous): Length 10.9 mm. to 12.85 mm.; width of head 1.68 mm. to 1.93 mm.; greatest width of body across mesoacetabula 3.15 mm. to 3.78 mm.

Female type (apterous): Length 11.55 mm.; width of heard 1.76 mm.; greatest width of body across mesoacetabula 3.36 mm.

Color: Reddish brown above, pale testaceous beneath. Head with two converging black lines between the eyes. Clypeus embrowned to black, antennae brownish black. Anterior margin of pronotum between the eyes black; front femur with two longitudinal blackish bands. Mesopleura with two black bands separated by a silvery pile. Middle and hind femora reddish brown, covered with short black setae; middle and hind tibiae darker.

Structural characteristics: Relative length of antennal segments. Male holotype: 1st:2nd:3rd:4th::137:35:40:26. Female allotype: 1st:2nd:3rd:4th::104:26:32:22.

Actual Lengths of Leg Segments

Front leg	Femur	Tibia	1st tarsal segment	2nd tarsal segment
Male paratype	7.04 mm.	0.42 mm,	5.51 mm.	1.50 mm.
Middle leg	Femur	Hind leg		Femur
Male paratype	20.5 mm.	Male paraty	pe	27.1 mm.

Male. Length of pregenital abdominal segments:Genital segments::67:50. Middle femur heavily ciliated ventrally on distal Ptilomera (Ptilomera) werneri Hungerford and Matsuda

FIG. 1. Male paratype, genital segments viewed from the right side showing the large bifurcate paramere.

Fig. 2. Male paratype, genital segments as seen from below. Note the finger-like caudal projection of the pygofer.

FIG. 3. Female allotype, ventral view of caudal segments.

FIG. 4. Female allotype. Note the protuberance on the seventh tergite, the short connexival spines, the lack of a ventrolateral lobe on the seventh abdominal segments and the curious shape of the median caudal lobe of the seventh ventrite which is shown in Figure 3.

FIG. 5. Male paratype. Note the long median lobe of the suranal plate and the very small lateral wings. The first genital segment is much larger than the second.





half, bare on basal half; tibia with adpressed hairs beneath. Middle and hind femora with many short black spicules above. Genital segments: Suranal plate, with median lobe broad at base but abnormally long, its tip rounded; lateral wings abnormally short. Pygofer unusually short, its dorsolateral projections directed dorsad, short and tips rounded. Dorsolateral margins of pygofer beyond dorsolateral projections parallel for a short distance and then steeply converging to form a finger like caudal tip of the pygofer. Paramere short, stout and bifurcate at distal end. First genital segment ventrally with a median longitudinal keel and with a depression on either side.

Female. Length of thorax: Abdomen::60:70. Seventh abdominal tergite plainly longer than the sixth, and with a dorsally directed protuberance on its rear margin. Connexival spines short and pointed, arising from end of connexivum. Dorsolateral lobe of seventh abdominal segment short, broad. Without ventrolateral lobe. Shape of distal median lobe of the seventh sternite as shown in Plate XXXI figs. 3, 4.

Comparative notes: This is the only known species with a bifurcated paramere in the male and the only known species with a protuberance on the seventh abdominal tergite in the female.

Types: Described from holotype, allotype and two male paratypes bearing the labels "Mountains w. of Lapulapu Iwahig Penal Colony, Palawan Isl. 2000 to 3000 ft. March 1-2, 1947," and C. N. H. M. Philippines Zool. Expeditions (1946-1947) F. G. Werner leg." The types are in the Chicago Natural History Museum except for the one male paratype in the Francis Huntington Snow Museum, K. U.

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* = synonym

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